The Effect of Government of Pakistan's Common Facility Centre (CFC) Program on Small and Medium Enterprise (SME) Competitiveness: The Role of SMEs' Dynamic Capabilities

A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

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DECLARATION

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

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Khuram Shahzad

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In Memory

of my late

Father, Abdul Rehman Siddhu (Late)

Phupho and Spiritual Mother, Khalida Sadiq (Late)

Mentor and Teacher, Prof. Dr. Hasan Sohaib Murad (Late)

These people played a great role in my personal, professional, and ethical upbringing to make me a positive and contributing human to society.

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LIST OF ABBREVIATIONS

SME – Small and Medium Enterprises

CFC – Common Facility Centre

CI – Cluster Initiatives

RBT – Resource Based Theory

DCT – Dynamic Capability Theory

ACAP – Absorptive Capacity

NCAP – Networking Capability

BRICs – An association of five major emerging national economies: Brazil, Russia, India, China and South Africa

PPP – Public Private Partnership

GDP – Gross Domestic Product

GNP – Gross National Product

SMEDA – Small and Medium Enterprises Development Authority, Pakistan

UNIDO – United Nations Industrial Development Organization

ADP – Asian Development Bank

EFA – Exploratory Factor Analysis

CFA – Confirmatory Factor Analysis

UNDP – United Nations Development Program

HDI – Human Development Index

SEM – Structural Equation Modelling

AMOS – Analysis of a Moment Structure (statistical software)

KMO – Kaiser-Meyer-Olkin (test to assess the appropriateness of using factor analysis on data)

PCA – Principle Component Analysis

AVE – Average Variance Extracted

ABSTRACT

The small and medium enterprise (SME) sector is considered the backbone of a country's economic development process. SMEs in developing countries face the challenges of resource and capability shortages that hinder their productivity, innovation, and competitiveness in domestic and international markets. To safeguard their SMEs from the negative effects of resource shortages, governments develop industrial clusters and design support programs for clustered firms. One such program, called the 'Common Facility Centre' (CFC) program, was designed by the Government of Pakistan (GOP) to preserve its manufacturing sector's SME competitiveness through the provision of advanced production technologies and technological knowledge and skills. This study is designed to investigate the effect of this CFC program on the competitiveness of recipient SMEs in Pakistan. The study also intends to explore the role dynamic capabilities play for SMEs harnessing greater competitive benefits from this support program. Extant research on the effectiveness of governments' support programs has produced mixed results. Previous studies have also rarely considered how internal capabilities of firms impact the competitiveness effects of these support program. The theoretical framework for this study is based on resource-based theory (RBT) and dynamic capabilities theory (DCT). Using a multidimensional competitiveness measure, this research hypothesises that the use of the CFC program enhances production, innovation, internationalisation and market competitiveness among SMEs. It is also hypothesises that SME absorptive capacity (ACAP) and networking capability (NCAP) moderate the effect of the CFC program on their competitiveness. By using a cross-sectional survey and a self-administered

structured questionnaire, data is collected from 224 users (SMEs) of the CFC program all over Pakistan. Findings reveal that use of the CFC program has a positive significant effect on production, innovation, and market-based competitiveness of user SMEs, but no significant effect on the internalisation competitiveness dimension. The ACAP of user firms does not moderate the effect of CFC program use on any of the competitiveness dimensions. NCAP of user firms moderates the effect of CFC program use, but only on the internationalisation competitiveness of user SMEs. Both significant and non-significant findings offer useful insights for research and practice.

Keywords: Competitiveness; Common Facility Centre; Dynamic Capabilities; Effectiveness; Pakistan; SMEs; Support Programs

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND OF THE RESEARCH

The contribution of small and medium enterprises (SMEs) into a country's economic, social, and entrepreneurial development processes has received significant recognition (Bianchi, Glavas & Mathews 2017; Kim et al. 2014; Mubarik, Govindaraju & Devadason 2016; Tan, Brewer & Liesch 2018). SMEs generate employment, enhance exports, lower imports bills, adapt and produce innovative products, grow into larger enterprises, and, as a result, substantiate the country's economic development process (Antonelli et al. 2015; Hsing-Kuo & Yu-Fang 2012; Lampadarios, Kyriakidou & Smith 2017). However, due to globalisation, free-market structures, and rapid technological advancements, SMEs all over the world, specifically in transition and developing economies, face an increasing challenge of competitiveness (Brenner & Muhlig 2013; Liao, Welsch & Stoica 2013; Liñán, Paul & Fayolle 2019; Mubarik, Govindaraju & Devadason 2016). Poor access to advanced technologies (Palacios-Marqués, Soto-Acosta & Merigó 2015), higher product development and production cost (Gylling et al. 2015), weak networking and international orientation (Galkina & Chetty 2015; Senik et al. 2011), limited research, lack of technological competencies (Arokiasamy & Ismail 2009), weak collaboration between business functions, and lack of intellectual and financial resources to implement ICTs (Awa, Ojiabo & Emecheta 2015; Neirotti & Raguseo 2017) are among the few mainstream factors that have been found to be impediments for SME competitiveness.

The literature related to SME competitiveness suggests that adequate external support through the provision of critical resources can help SMEs overcome these

barriers and successfully compete in domestic and international markets (Cravo & Piza 2019; Doh & Kim 2014; Haddoud, Jones & Newbery 2017). Few emerging and widely adopted strategies by governments to hone SME competitiveness encompass the development of 'cluster initiatives' (CI) (Belitski & Desai 2016; Bergeron, Lallich & Bas 1998; Braune, Mahieux & Boncori 2016; Brenner & Muhlig 2013; Coletti & Maria 2015; Fensterseifer & Rastoin 2013), and entreprenurial ecosystem (Alvedalen & Boschma 2017; Stam 2015).

According to Sölvell, Lindqvist and Ketels (2003), a "Cluster Initiative (CI) is an organized effort to increase growth and competitiveness of clusters within a region, involving cluster firms, government and/or the research community" (p.9). The main idea behind the development of CIs is to provide SMEs with access to resources and networks that are critical for their productivity, innovation and overall competitiveness (Aragón et al. 2014; Autio et al. 2014; Belitski & Desai 2016; McDonald, Tsagdis & Huang 2006; Porter & Stern 2001; Valaei, Rezaei & Ismail 2017). CIs are now a common practice in developed (Bachtler & Mendez 2007) and developing economies (Schmitz & Nadvi 1999; Sonobe & Otsuka 2016).

Entrepreneurial ecosystem is also a geographical development effort involving "an interconnected group of actors in a local geographic community committed to sustainable development through the support and facilitation of new sustainable ventures' (Cohen 2006, p. 3). The entrepreneurial ecosystem focuses on the development of entrepreneurial community of 'high-growth start-ups' which is considered an important determinant of innovation, productivity growth, and employment (Mason and Brown, 2014). Though entrepreneurial ecosystem focuses on the interventions like the development of science parks and incubators (Miller & Acs 2017), researchers (i.e. read Spigel 2016) assert that the mere presence of such

arrangements may not serve the purpose and thus the need of an interplay between hard and soft infrastructure is warranted to promote the region and resident organizations. Entrepreneurial ecosystem and cluster initiative approach share a common notion of innovation and competitiveness through the engagement in the community (cluster/ecosystem) and draw the critical resources and ideas embedded in the networks (Pugh, Soetanto, Jack & Hamilton 2019; Stam 2015).

A review of the literature reveals that the CI and entrepreneurial ecosystem encompasses a range of support interventions undertaken within a cluster/ecosystem to support SMEs and entrepreneurial firms (Andersson et al. 2004; Intarakumnerd 2005a; Ketels, Lindqvist & Sölvell 2006; Sölvell, Lindqvist & Ketels 2003). Some common support initiatives, also called support interventions, include: export promotion programs (Brewer 2009; Haddoud, Jones & Newbery 2017; He, Brouthers & Filatotchev 2013), manufacturing improvement programs (De Meyer & Ferdows 1990; Lagacé & Bourgault 2003), technology diffusion and transfer programs (Bozeman 2000; Buratti & Penco 2001), financial and technological assistance (Zhang & Li 2010), network and trust building programs (Intarakumnerd 2005b; Li, Zubielqui & O'Connor 2015), human capital development programs (Boschma & Ter Wal 2007; Mubarik, Govindaraju & Devadason 2016), research and development support services (Barge-Gil & Modrego 2011; Bellucci, Pennacchio & Zazzaro 2019; Jun, Seo & Son 2012), business development assistance, provision of sector-specific technologies, or combinations of these (ADB 2009; Dominguez 2018; Seth et al. 2013; Shahzad 2015), science parks, and incubation centers (Phan, Siegel & Wright 2005). These support programs envisage providing SMEs access to critical technologies, knowledge and skills, and information that contributes to their domestic and

international competitiveness, which is difficult otherwise for SMEs to hold in-house mainly due to financial constraints.

One recently emerging but widely adopted support program approach is to provide SMEs with technological facilities such as scientific equipment, hard-core production technologies, and technical knowledge and capabilities in the targeted clusters (Nishimura & Okamuro 2011; Seth et al. 2013). According to Shin and Kim (2010) and Maranto-Vargas and Rangel (2007), the provision of technological support by governments enhances SME competitiveness by enabling SMEs to develop cost-effective, innovative, and competitive production technologies and products. (Ashekele & Matengu 2008; Seth et al. 2013). Leading economic development agencies, such as the United Nations Industrial Development Organization (UNIDO), United States Agency for International Development (USAID), the Asian Development Bank (ADB), Small and Medium Enterprise Development Authority, Pakistan (SMEDA), MSE-CDP India, call these physical technology-based infrastructure initiatives 'Common Facility Centres' (CFCs) (see ADB 2009; Ashekele & Matengu 2008; Mahmood 2006; Ramanigopal, Palaniappa & Hemalatha 2013; Seth et al. 2013; Shahzad 2015; SMEDA 2016; USAID 2008; World Bank 2013). In its functional description, CFC is a technology-based physical infrastructure project that is undertaken for the competitiveness of SMEs in a particular cluster by providing them access to technological knowledge and capabilities, which due to financial or other constraints, an SME may not be able to hold individually (Seth et al. 2013; USAID 2008). According to Seth et al. (2013) "[CFCs] are support initiatives that involve a physical infrastructure for the development of small and medium enterprises, belonging to one or more clusters, by providing them access to those facilities which would not otherwise be available to individual SME" (p.7).

Most SMEs, due to financial constraints, do not afford to hold such facilities and expertise in-house which impede their ability to upgrade their production technologies and skills to offer competitive products. Therefore, CFC operates like an independent institution/organization with a common pool of targeted production-specific physical infrastructure and technological skills development services for the upgradation of SMEs' production systems and technical skills pool to enhance their ability to compete in domestic and international markets through innovative products (Shahzad 2015).

1.2 CONTEXT OF THE STUDY: COMMON FACILITY CENTRE (CFC) PROGRAM

Pakistan, officially the Islamic Republic of Pakistan, is the world's sixth most populous country in South Asia. Pakistan is the 67th largest export economy in the world, with US$21.36 billion (2018–1019) export volume. Pakistan's estimated nominal gross domestic product (GDP) is US$283.3 billion, with US$1480.9 GDP purchasing power parity (PPP)/capita. Pakistan's economy is considered to be semi-industrialised having potential to emerge as one of the 'Next Eleven' (N-11), a group of 11 countries that, along with the BRICs, have a high potential to become the world's largest economies in the 21st century (Grant 2011).

The SME sector is the cornerstone of Pakistan's economic development process (Mubarik, Govindaraju & Devadason 2016; Nadeem, Faheem & Ali 2010). According to SMEDA, an enterprise is considered an SME if it has up to 250 employees, and/or paid-up capital up to 250 million rupees (Rs.), and/or an annual turnover of Rs250 million (Khalique et al. 2011). According to the SME Policy of Pakistan, around 3.2 million SMEs in Pakistan contribute around 30% in GDP, 25% in exports of manufactured goods, 35% in value-added production, 78%in non-agriculture employment and constitute over 90% of total privately run enterprises in Pakistan's

industrial sector (GOP 2007)[1]. The manufacturing sector, after agriculture, is the second largest sector of Pakistan, constituting 19.1% of the country's GDP, 13% of the country's total employment, and around 75% of Pakistan's exports (Raheman et al. 2010).

The Government of Pakistan (GOP) has been struggling to manage the uneven and weak contribution of its manufacturing sector SMEs into the country's economic growth (Ara 2004; Iqbal, Hameed & Devi 2012; Suleman et al. 2018). One of the major challenges faced by Pakistan in the manufacturing sector is to increase domestic and international competitiveness and achieve a positive balance of trade by lowering imports and increasing exports (Berry 1999; Imran, Aziz & Hamid 2017; Iqbal, Hameed & Devi 2012). However, the Pakistani manufacturing sector SMEs reportedly still rely on conventional technologies and production methods and also suffer from scarcity of skilled workforce, outdated technology, and little understanding of international standards and markets (Imran, Hamid & Aziz 2018; Khaliqueet al. 2011; Khattak, Arslan & Umair 2011; Kureshi et al. 2009; Mahmood & Haroon 2006; Mubarik, Govindaraju & Devadason 2016; Qureshi et al. 2013). These factors limit their competitiveness domestically and internationally.

To deal with these issues, the GOP, under its SME Sector Development Program, introduced a new support intervention in 2007 to export-oriented industrial clusters under the CFC Program (ADB 2009; Shahzad 2015). The CFC program was launched by the GOP in financial and technical collaboration with UNIDO, ADB, and SMEDA. The program aimed for technological up-gradation and skills enhancement of specific manufacturing sector SMEs in different clusters, especially those with export potential,

[1] http://www.smeda.org/index.php?option=com_content&view=article&id=58:sme-policy-development&catid=2

to augment the competitiveness of Pakistan's manufacturing industry in domestic and international markets (Seth et al. 2013; Shahzad 2015). The fundamental assumption behind this CFC program is that the competitiveness of SMEs—whether domestic or international—largely depends on their technological capabilities, product development, production value-addition, and information about international markets (Bianchi, Glavas & Mathews 2017; Pucci, Nosi & Zanni 2017; Soto-Acosta, Popa & Palacios-Marqués 2016), which most Pakistani SMEs lack (ADB 2009; Government of Pakistan 2015-2016; Mustaghis-ur-Rahman, Stough, & Jalees 2015). Hence, the main objective of the GOP, which drove the establishment of the CFC program, is to enhance the competitiveness of its manufacturing sector SMEs by specifically increasing their production, technological, innovation, and internationalisation capabilities (Seth et al. 2013; Shahzad 2015).

Under the CFC program, it was planned to establish or upgrade around 50 CFCs in the country. These centres provide a common pool of cutting-edge production machinery/equipment, testing and inspection services and processes/technology-related services. CFCs develop technical capacity of the workforce through on-demand technical training, assistance, and consultancy in high precision manufacturing for the collective up-gradation of groups/clusters of SMEs. In its functional domain, a CFC operates as an independent, autonomous, and formal organisation and offers: 1) production facility (for production of products), 2) technical training (for latest production and product development techniques), 3) consultancy (for latest production and processing techniques), 4) research and development (raw material testing and inspecting, laboratory, design development etc.), and 5) information sharing (about standards, exports, markets, technologies etc.) (Shahzad 2015). CFCs offer these services on a paid basis and any SME located in the

respective cluster can use them on a first-come-first-serve basis. As such, contrary to other support programs in the world, there are no selection criteria for SMEs to use this program. SMEs choose to use these facilities and services based on their needs for improving quality, innovation, and value addition in their production processes and products, and to train their technical workforce on the targeted technologies necessary to meet international standards and market requirements (Shahzad 2015).

1.3 RESEARCH PROBLEM AND GAPS IDENTIFICATION

Recently, there has been interest among researchers, policy makers, and international development agencies in the effectiveness of support programs; however, empirical research in this area is limited (Ayob & Freixanet 2014; Cin, Kim & Vonortas 2017; Doh & Kim 2014; Jun, Kim & Park 2017; Vaessen 2010). Further, among the limited available research, studies are focused on support programs that typically include the provision of financial and soft support (i.e., information, networking, and knowledge) to firms. The support program literature is deficient in adequately capturing new and recent developments that have taken place with respect to the designs and structures of support programs. Cravo and Piza (2019), in their recent meta-analysis, identified five categories/types of support initiatives: 1) matching grants/credits, 2) training and management programs, 3) local production systems support, 4) innovation policies, and 5) access to external markets. In their meta-analysis, there was no identification of the provision of common production facilities and technologies to help SMEs boost their production competitiveness.

The CFC program is a new and distinct concept/intervention in the support program literature and thus requires empirical insights for its design and delivery effectiveness. However, there has been very limited scientific research undertaken on this support

program. There are only two studies, conducted by Shahzad (2015) and Seth et al. (2013), on the effectiveness of CFCs in Pakistan. However, these researchers used case studies to assess the CFC's operational performance, and thus ignored the perspective of recipient firms. Contemporary scholars in the field have been increasingly arguing for the inclusion of firms' (SMEs') perspectives, larger sample sizes, and empirical studies for the assessment of SMEs support initiatives (Ayob & Freixanet 2014; Doh & Kim 2014; Freixanet 2012; Hassan & Abu Talib 2015; June & Colleen 2004; Katsikeas, Leonidou & Morgan 2000; Liberati, Marinucci & Tanzi 2016; Nishimura & Okamuro 2011; Szczygielski et al. 2017; Vlachvei & Notta 2016; Wilkinson & Brouthers 2000). To the best of the researcher's knowledge, there is no single empirical study available to date that has evaluated the effectiveness of the CFC program from the perspective of SME competitiveness in the Asian region in general, and in Pakistan specifically.

Pakistan provides an important research laboratory for the support program literature in the Asian region. CFC project is a joint effort between multiple international development agencies (i.e., UNIDO, ADB, JICA) who have been launching industrial support programs in Asia and using their cross-country and regional knowledge and learning to determine effective models for industrial development and support initiatives. Pakistan has accumulated significant experience in designing support programs and interventions that directly target entrepreneurship development, technological upgrading, and SMEs competitiveness to enhance the country's economic growth. Most research on support programs has been performed in Western or developed regions and thus scholars have called for empirical insights about the design, functioning, and effectiveness of support programs in Asian or developing regions (Kotabe, Jiang & Murray 2014; Mehrotra 2013). Insights gained from the study

of the CFC program will help diverse stakeholders use cross-country learning to define and design industrial policy and development strategy for future support programs.

Further, governments support programs by providing SMEs with access to critical resources and fundamentally assume that competitiveness of the recipient firms will be improved as a result. Although studies have found a positive impact of support programs (Durmuşoğlu et al. 2012; June & Colleen 2004), empirical studies indicate contrary results. For instance, Wilkinson and Brouthers (2000) revealed that some elements of a government's support program negatively influenced the export performance of firms. Lages and Montgomery (2005) found that the total effect of export assistance on the annual export performance of firms was not significant. With respect to the context of developing countries, Batra and Mahmood (2003) suggested that most SME support programs failed to showcase any improvement in firms' performance. A recent study conducted by Alonso-Nuez and Galve-Górriz (2012) also failed to find support for the effectiveness of government support program as there was no significant difference in the performances of assisted and non-assisted firms. Given this contradiction, it seems very difficult to draw any conclusions about the effectiveness of external assistance programs. Scholars widely argue that in mixed and theory-contrary findings the inclusion of boundary conditions and intervening factors (Baron & Kenny 1986; Pergelova & Angulo-Ruiz 2014), theoretical remodelling (Gencturk & Kotabe 2001; Lages & Montgomery 2005), and mindful selection of variables and measurement approach (Szczygielski et al. 2017) may offer help in explaining and resolving the variation issues. However, there is little research that has paid attention to the intervening factors while studying the direct effect of support programs on firms' competitiveness.

Scholars argue that SMEs may differ in their abilities to acquire, process, and implement external knowledge and resources, and thus this heterogeneity may contribute to their actual gains from external resource stock (Liao, Welsch & Stoica 2013). Most studies have used resource-based theory (RBT) to argue that firm competitiveness is solely determined by the stock of critical and unique resources they possess (Barney & Clark 2007; Penrose 1959; Wernerfelt 1984). Evaluation of support programs through an RBT lens seems problematic as it does not indicate which capabilities of firms play a role in harnessing greater competitive benefits from external support programs. Review and analysis of the literature reveals that the extant research has examined the characteristics that 'resources' must have (i.e. valuable, rare, inimitable, non-substitutable) to yield competitiveness; however, there is an acute paucity of research that has focused on the characteristics that a 'firm' must have to make resources yield competitiveness. This neglect may be responsible for the inconsistency found in support programs' performance effects, because, consistent with the strategic capabilities perspective (Barney et al. 2011), recipient firms' internal capacity is critical for acquiring and utilising resources from external support for the realisation of competitive performance (Theoharakis, Sajtos & Hooley 2009; Ulaga & Reinartz 2011). In light of these theoretical arguments, it seems logical to include the internal capabilities of recipient firms of the CFC program to determine if their capabilities play any role in gaining higher competitiveness benefits from their use of the program.

Dynamic capability theory (DCT) in this regard provides promising theoretical underpinnings. According to Teece, Pisano and Shuen (1997) dynamic capability is "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (p.516). Accordingly, firm competitiveness

will be largely determined by its ability to build, rebuild, configure, and reconfigure tangible and intangible resources to sense, shape and seize market opportunities (Barreto 2010; Rodríguez-Serrano & Martín-Armario 2019). The dynamic capability of SMEs is expected to enhance their capacity to adopt new technologies and skills from the CFC program and develop innovative processes and products to achieve superior, long-term performance (Helfat 1997; Wu 2010). Therefore, SMEs must have access to external resources and internal dynamic capabilities to take advantage of the CFC program (Tsai 2001). Despite this promising theoretical justification, little research has considered internal capabilities among SMEs in the support program evaluation literature.

In the literature, a large number of scholars have recognised 'absorptive capacity' (Kotabe, Jiang & Murray 2014; Lichtenthaler & Lichtenthaler 2009; Van Den Bosch, Volberda & De Boer 1999; Zahra & George 2002) and 'networking capability' (Agarwal & Selen 2009; de Felice 2014; Styles et al. 2006; Voudouris et al. 2012) as critical dynamic capabilities needed for a firm to achieve competitive performance (Kotabe, Jiang & Murray 2014). According to Zahra and George (2002), absorptive capacity (ACAP) is a firm's ability to acquire, assimilate, transform, and exploit external knowledge. ACAP is embedded in a firm's routines, through which it acquires resources from external sources and then combines them with present resources to achieve unique resource-configuration to exploit market opportunities (Dess, Lumpkin & McKee 1999; Wang & Han 2011). Studies have found ACAP to be a significant predictor of a firm's ability to explore and exploit external resources to achieve superior performance (i.e. see Flatten, Greve & Brettel 2011; Francalanci & Morabito 2008; García-Morales, Ruiz-Moreno & Llorens-Montes 2007; Liao, Welsch & Stoica 2013). Therefore, it is expected that SME access to CFC resources is neither sufficient nor

the only element to explain their competitiveness. The CFC program provides access to technologies and technical knowledge and skills; however, conversion of this technological knowledge in the development of new or improved products and production processes seems to be largely influenced by ACAP (i.e., an SME's ability to access, process, and exploit CFC resources). Little is known, however, about how SMEs' ability to derive competitiveness from external resources can be influenced by their ACAP.

On the other hand, literature on the role of networks indicates that SMEs' networking capability (NCAP) is a dynamic capability (de Felice 2014; Voudouris et al. 2012) that helps firms overcome resources and capabilities limitation, take better advantage of external resources (Aldrich, Rosen & Woodward 1987; Andersson, Evers & Griot 2013; Brekke 2015), adopt advanced production technologies (Abd-Rahman & Bennett 2009), deal with uncertainty (Sheng, Zhou & Li 2011), enter into international markets (Musteen, Francis & Datta 2010) and gain competitive advantages (Bouncken, Pesch & Reuschl 2016; Vesalainen & Hakala 2014). NCAP refers to the ability of a firm to develop, maintain, and utilise inter-organisational relationships to gain access to and advantage from the resources held by the external constituencies (Parida et al. 2017; Walter, Auer & Ritter 2006). Extant literature has studied NCAP mostly in relation to external resources such as competitors, customers and suppliers (Rowley, Behrens & Krackhardt 2000; Zeng, Xie & Tam 2010). However, little research has conceptualised and investigated the role of SMEs' NCAP in the acquisition of external resources from government sources (Kotabe, Jiang & Murray 2014), such as support programs.

Based on these arguments, it seems beneficial to investigate and explore the roles of ACAP and NCAP in SMEs gaining more competitiveness from the use of the CFC

program. However, despite these strong theoretical justifications, no study on support programs in general, and the CFC program specifically, has considered the role of recipient firms' dynamic capability in the relationship between support program use and firm competitiveness.

Finally, the literature lacks consensus as to how competitiveness should be defined and measured, which has left this concept elusive and misunderstood (Bhawsar & Chattopadhyay 2015a). Most studies have used financial indicators, single measures, or a few indicators to measure firm competitiveness, whereas the literature indicates that it is a complex and multidimensional phenomenon that should be measured with respect to its unique scope and context and by applying multifaceted frameworks and multiple variables (Ajitabh & Momaya 2003; Chaudhuri & Ray 1997; Depperu & Cerrato 2005; Flanagan et al. 2007; Liučvaitienė et al. 2013; Vlachvei & Notta 2016). Measurement of manufacturing sector SME competitiveness is particularly challenging because these firms have to outperform competitors simultaneously in areas of production, technology adoption, innovation, market expansion, and financial returns. In the case of the CFC, the program intends to affect all these outcomes, and therefore it is an important decision to select all these relevant dimensions for its effectiveness evaluation (Storey 2008). Currently available frameworks do not sufficiently address the need for the specific measurement of manufacturing SMEs competitiveness (Bhawsar & Chattopadhyay 2015b; Cetindamar & Kilitcioglu 2013), and thus consideration of multiple outcomes or indicators that best match the context and objective of competitiveness evaluation may be an important value addition (Coates & McDermott 2002). Studies conducted by Gencturk and Kotabe (2001) and Szczygielski et al. (2017) concluded that the evaluation of the government's assistance program's effectiveness is largely influenced by performance dimensions

researchers use for evaluation. Freixanet (2012) contends one of the reasons for the inconsistent findings related to support program impact may be overly simplistic and isolated selection of measurement criteria. Therefore, this study tends to deploy multidimensional criteria to measure the competitiveness of beneficiary firms of the CFC program.

1.4 RESEARCH OBJECTIVES AND QUESTIONS

From the previous discussion, it is evident that there is shortage of empirical research on the performance evaluation and enhancement of SME support programs in general and the GOP's CFC program in particular. Very little has been written about whether government support helps SMEs overcome resource shortage and improve competitiveness (Kotabe, Jiang & Murray 2014), and how policy makers and project managers can make these program more effective (Diallo & Thuillier 2004; Ika, Diallo & Thuillier 2012; Khang & Moe 2008; Seth et al. 2013; Shahzad 2015). It is also evident that SME capabilities have not been considered sufficiently by extant studies to understand their influence on the competitiveness effects of support programs. The literature largely indicates that ACAP and NCAP are two core dynamic capabilities that may influence SME ability to use external resources to achieve a higher level of competitiveness (Kotabe, Jiang & Murray 2014; Liao, Welsch & Stoica 2013; Parida et al. 2017).Therefore, the main objective of this research is:

> "to investigate whether the GOP's SME support program, the 'Common Facility Centre' (CFC) program, has contributed to the competitiveness of SMEs and if the dynamic capabilities of SMEs, such as ACAP and NCAP, enhance the CFC's competitiveness effect."

RESEARCH QUESTION

To achieve this research objective, the following research questions will be answered.

1- To what extent does the use of the CFC program contribute to the competitiveness of user SMEs?
2- What roles do ACAP and NCAP of user SMEs play in the relationship between CFC program usage and SMEs competitiveness?

1.5 SIGNIFICANCE OF RESEARCH

This study seeks to build on the extant theory and research by contributing to the support programs, dynamic capabilities, and firm competitiveness literatures:

1- By empirically investigating the effect of the CFC program on firms' competitiveness, this study contributes to the evidence about the role of support programs in SMEs competitiveness.
2- Through its inclusion of ACAP and NCAP as the firm's dynamic capabilities, along with RBT, this research advances the literature and conceptualisation of support programs in general and the CFC program in particular. This study extends this concept to the CFC program in an attempt to explain that the effectiveness of support programs may be a function of both provision of critical external resources and recipient firms' internal capabilities.
3- This research provides a multidimensional and comprehensive framework/criteria to evaluate SME competitiveness particularly in the manufacturing sector, which has been the subject of controversial and elusive debate.

4- This study will help policy makers and implementing agencies to showcase the progress of CFCs to win the trust of government/donors and other key stakeholders to continue investment in these programs. It will also be helpful for the government of Pakistan to: identify the contribution of the CFC program in firms' development and competitiveness, investigate the areas for improvement, and to envisage the instrumentality of CFCs in achieving broader economic growth. This, in turn, provides the potential for the government to pledge more resources to existing and future CFCs.

5- This research makes a contribution by providing empirical knowledge about SME support programs and their effects on firms' competitiveness in developing country's context. However, conceputalisation and findings of this research could be beneficial to developed countries as well, as these countires may learn new forms of support programs i.e. CFC program and combination of both hard and soft production-focused technological support to improve SMEs competitiveness. SME development requires a comprehensive and informed strategy from government that includes the ability of governments to implement supportive technological and production infrastructure, technologically skilled workforce, and the ability of SMEs to implement competitive production practices and business strategies. Therefore, this study will help both developed and developing countries to integrate technological needs of SMEs to craft policies and support programs to enhance their competitiveness.

1.6 RESEARCH METHODOLOGY

The purpose of this research is to test a theoretical model to explore how technological support, such as the CFC program, contributes to the competitiveness of SMEs, and what role SME dynamic capabilities play in harnessing competitiveness benefits from the use of the CFC program. This study intends to address the aforementioned research gaps and subsequent questions by adopting the philosophical assumptions of a positivist paradigm. A quantitative research strategy and a cross-sectional survey design is used for the collection of data. The study includes a self-administered, structured questionnaire to collect data from SMEs using the CFC program in different sectors/clusters of Pakistan. Previous studies on the evaluation of external support programs have used similar methodological approaches (see Ayob & Freixanet 2014; Durmuşoğlu et al. 2012; June & Colleen 2004; Shamsuddoha, Ali & Nelson Oly 2009). First, information about participants who use CFC program is obtained from all CFC organisations providing services to SMEs in different clusters/industries in Pakistan. Second, a survey questionnaire is designed to collect data from SMEs who have been using CFC program services. Then the data is analysed using SPSS software and AMOS. The thesis then uses Exploratory Factor Analysis (EFA) followed by Confirmatory Factor Analysis (CFA) to conduct, explore and validate the underlying dimensions and respective constructs of firm competitiveness, ACAP, and NCAP. Finally, the hypotheses are tested using structural equation modelling in AMOS.

1.7 ORGANISATION OF THE THESIS

Chapter 1 outlines the background of this study, research gaps that are identified from the literature, research objectives, and subsequent research questions, and justifications for undertaking this research.

After establishing the platform for the research, Chapter 2 provides an overview of the literature review related to SME competitiveness, RBT, and DTC with a focus on the ACAP and NCAP of firms. This is followed by a discussion of the definitions and measurement issues of firm competitiveness. At the end of the chapter, SME competitiveness and the CFC program are discussed with respect to Pakistan.

Chapter 3 outlines the development of the theoretical framework and subsequent hypotheses. In this section, particular emphasis is given to the development of causality between the use of the CFC program and firm competitiveness in light of theoretical underpinnings offered by RBT. This is also explained by using theoretical underpinnings of DTC, ACAP, and NCAP as to how the internal capabilities of firms influence or complement the effect of the use of the CFC program on their competitiveness. Using relevant conceptual and empirical research, hypotheses are then outlined at the end of this chapter.

Chapter 4 explains and justifies the research paradigm, research strategy, and data collection methods. Information about research instrument development, the data collection process and the outcome of data collection is given in this chapter.

Chapter 5 provides analysis of the data using descriptives, exploratory factor analysis, confirmatory factor analysis, and structural equation modelling.

Chapter 6 then discusses and compares the findings and offers insights for theory, research and practice. The limitations of this research and directions for future research are explained at the end of this chapter, followed by the conclusion of the study.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter investigates the relevant literature to understand the dynamics of SME competitiveness and role of government support programs in the development of SME competitiveness. This chapter specifically draws on RBT and DCT to conceptualise a model to investigate the effect that CFCs may have on firm competitiveness, along with the influence of dynamic capabilities of SMEs. The first part of this chapter explains the phenomenon of SME competitiveness. The second part discusses the theoretical foundations of competitiveness and discusses the discourse that RBT and DTC offer in the context of SMEs. ACAP and NCAP are discussed as two core dynamic capabilities of a firm in achieving competitive performance. The third part discusses the role of the CFC program in the development of SME competitiveness with respect to RBT and DTC theoretical underpinnings. Finally, SME competitiveness issues in Pakistan, and the overall structure and functioning of the CFC Program are described.

2.2 SME COMPETITIVENESS

SMEs contribute substantially to every country's GDP and constitute a major portion of manufacturing industries. Provision of advanced scientific equipment, production technologies, technical knowledge and skills, and information about markets is considered critical for manufacturing SMEs to cope with the challenges of competitiveness in continuously changing markets and rapid technological developments (Brenner & Muhlig 2013; Mubarik , Govindaraju & Devadason 2016). However, due to many problems faced by SMEs, mainly because of their small size and limited financial capacity, it becomes difficult for them to access, acquire and hold

such resources to maintain competitiveness (Bellucci, Pennacchio & Zazzaro 2019; Lagacé & Bourgault 2003; Lu & Beamish 2001). Individual SMEs lag behind in integrating themselves in international value chain processes due to reliance on out-dated technologies, limited production capacity, lack of economies of scale benefit, less innovative and diversified products, and poor access to key information about raw material, financial support, markets, technological innovation, and digital technologies (Chen, Papazafeiropoulou & Wu 2011; Singh, Garg & Deshmukh 2008, 2010). In developing countries such as Pakistan, SMEs work on narrow profit margins, which reduces their ability to invest in new technologies and products which, in turn, eventually leaves them unable to capitalise on emerging global opportunities (Ceglie & Dini 1999; Singh, Garg & Deshmukh 2010). Lagacéand Bourgault (2003) argue that the capability of SMEs to acquire critical resources and make improvements in production and overall business processes has become a critical factor in their competitiveness. Scholars assert that, to fill this resource gap, SMEs tend to identify options such as alliances or public assistance programs where they can economically acquire or rent-out critical resources and capabilities to enhance their competitiveness (Bellucci, Pennacchio & Zazzaro 2019; Chen, Wu & Lin 2006; Street & Cameron 2007).

2.3 THEORETICAL UNDERPINNINGS FOR SME COMPETITIVENESS

SMEs competitiveness can be understood as an ability of individual firms to compete in domestic as well as in international markets (Krugman, 1996). The determinants of competitiveness are changing and technological competence, skills, work discipline and trainability, competitive supplier clusters, strong support institutions, good infrastructure and well-honed administrative capabilities are the new tools of competitive advantage for firms. Given this, the 'bottom line' of competitiveness is to

upgrade technologies in all activities, building new capabilities and finding new markets and market niches. At the same time, the dynamics of world markets suggest that it is necessary to promote structural change, and nearly all countries that have maintained high rates of export growth need to upgrade the technological composition of product development and exports.

Scholars widely argue that firms' competitiveness is largely dependent on the provision of state-of-the-art technologies and equipment for production and delivery. Although, this argument carries weight as there exist a number of failed stories due to the lack of advanced technologies, but it is also pertinent to understand that competitiveness is not only a matter of provision of advanced equipment in the firms, instead it also needs technical knowledge, skills and management practices to exploit full potential of these technologies (Spigel 2016; Stam 2015). There are evidences showing that many firms having comparable technologies perform quite differently in terms of efficiency and effectiveness. It is also important for firms to have good knowledge of international markets and ways of venturing into those areas. This set of knowledge and skills, mostly called 'organizational capabilities' involve reasonable cost and time to be developed. SMEs usually lack investment to be made on capability development and thus often operate on the capacity much less than their true potential. Support programs are developed by governments to provide under privileged/performing SMEs with advanced technologies, infrastructure, knowledge, skills, and capabilities.

Firm competitiveness has long been discussed in the strategic management literature. The main question of concern is: how and why do some firms develop competitive capacity and perform better than others? Scholars from the strategic management field have used multiple theories to explain performance heterogeneity among firms.

However, RBT and DCT are widely used to explain why and how few firms gain sustainable competitive performance. The following section contains the description and critical review of these theories.

2.4 RESOURCE-BASED THEORY

RBT has emerged as a powerful and widely used theoretical perspective to explain the phenomenon of firm competitiveness and persistent performance. According to RBT, a firm's competitiveness or superior performance is largely determined by the quality, heterogeneity, and utilisation of the bundle of resources it owns and controls (Barney 1995; Penrose 1959; Wernerfelt 1984). Resources can be defined as all assets, capabilities, competences, processes, information and knowledge that an organisation holds and uses to formulate its strategy to sustain its productivity (Barney 1991)—where productivity is the function of efficiency and effectiveness (Daft 2006). Firms possess both tangible (financial and physical assets such as cash, machinery, and equipment) and intangible (capabilities, brand name, processes, and knowledge of technologies) resources, however RBT focuses only on the rare, valuable, inimitable, and non-substitutable bundle of resources that enable an organisation to gain competitiveness (Barney & Clark 2007; Dierickx & Cool 1989). According to RBT, development of competitiveness depends on the quality of distinct resources that a firm holds and the capability of that firm to make use of those resources in such a way that it would be difficult for competitors to imitate or substitute (Barney 1991; Prahalad & Hamel 1994). According to Wernerfelt (1984) distinct resources can build a barrier for others to enter and compete in the market. However, the creation of this resource-based barrier depends on the mode of acquisition and utilisation of those resources by a specific firm from the resource factor market (Dierickx & Cool 1989). Firms develop or acquire distinct resources from the market and strive to reach the position

where their resource position makes it difficult for others to catch up (Barney & Clark 2007).

Given this resource positioning, RBT argues that competitiveness is a result of a unique combination of tangible (assets) and intangible (capabilities) resources that a firm develops after a socially-knitted, complex, long, hit-and-trial, and learning process. Firms use their knowledge and capabilities to acquire, develop and utilize both tangible and intangible resources to achieve the goal of valuable, rare, inimitable, and non-substitutable resources that leads to sustainable competitiveness (Amit & Schoemaker 1993; Barney & Clark 2007). During this process, organisations make sense of environmental changes and go through many strategic, operational, cultural and structural adjustments to stay competitive in the market. Since this development and change process involves the interaction of both systems and people, it practically becomes very difficult for rivals to copy or develop the same combination of resources that provides a competitive advantage. According to RBT, the competitiveness or superior performance depends on the ability of the firm to develop distinct and quality resources along with requisite capabilities to develop its competitive capacity to achieve consequent competitiveness (Pergelova & Angulo-Ruiz 2014).

Although RBT, over the past 20 years, has been extensively used to explain performance differences among firms (Chadwick, Super & Kwon 2015), some scholars argue that this theory does not properly explain which capabilities build a firm's competitive capacity for competitive performance (Lockett, Thompson & Morgenstern 2009). Critics further argue that RBT's main assumption—that resources are heterogeneous and can lead to sustainable performance—makes the theory static as it ignores the evolution and development of resource stock especially in a dynamic environment (Priem & Butler 2001). Firms operate in an increasingly changing

environment that requires them to constantly change strategic directions, upgrade and reconfigure resources stock, and adapt to new customers' demands. Due to rapid technological changes and resultant short product life cycles, it has also become almost impossible for firms to even sustain the same competitive advantage in the long run (Li & Liu 2014). This environmental dynamism necessitates continued learning, adoptability and change management in the organisation. However, how firms change the configuration of resource stock to develop new competitive advantage and sustain superior performance is an important concern among practitioners and scholars. Kor and Mesko (2013) argue that since, theoretically speaking, all firms are a bundle of tangible and intangible resources, it seems difficult for a firm to achieve competitive performance on the basis of any single intangible resource. The development of a unique configuration among tangible and intangible resources is needed, which will lead to superior performance; and this configuration will change continuously (Barneyet al. 2011). Though RBT does address acquisition and development of intangible resources, it seems unable to explain the dynamic aspects of resources and the role of firm's capabilities in the development of new competitive advantages.

2.5 DYNAMIC CAPABILITY THEORY

DCT is a widely used theory to explain the difference in competing firms' performance (Barreto 2010; Helfat & Peteraf 2015; Wu 2010). The concept of dynamic capability is mostly attributed to Teece and Pisano (1994), who attempted to answer questions related to firm performance in a dynamic environment. According to Teece, Pisano and Shuen (1997), dynamic capability is "the firm's ability to integrate, build, and reconfigure internal and external competences/capabilities to address rapidly changing environments" (p.516). In the literature, the term competence or capability

usually refers to the capacity of a firm to perform a task or function in a reliable manner whenever it is required (Helfat & Peteraf 2015; Helfat & Winter 2011). DTC fundamentally assumes that the change in competition dynamics is constant, whereby the failure/success of firms is largely dependent on their ability to adapt, integrate and reconfigure internal and external knowledge and capabilities (Eisenhardt & Martin 2000a; Teece, Pisano & Shuen 1997). According to DCT, a firm's performance is more than a function of a bundle of resources; instead, it is a firm's ability to learn, accumulate, coordinate and redeploy internal and external resources and capabilities to achieve higher responsiveness, product innovation and resultant superior performance (Helfat & Winter 2011). Thus, the sustainable competitive advantage takes place as a result of a blend and sequence of multiple tasks and activities in the firm (Helfat & Winter 2011). To be performed efficiently and effectively, every task or activity requires a firm to possess a minimum level of capabilities (Helfat & Peteraf 2015).

Capabilities are developed over time as organisations undertake and learn from new tasks, which increases their capability to perform the same task again in the future (Rodríguez-Serrano & Martín-Armario 2019; Zollo & Winter 2002). However, as the environment changes frequently, it is difficult for a firm to sustain any competitive advantage by using the same set of capabilities (Li & Liu 2014). Thus, firms need to constantly learn, acquire and renew the stock and configuration of their capabilities as per emerging environmental and market dynamics (Chen, Lin & Chang 2009; Helfat & Peteraf 2015; Kessler, Bierly & Gopalakrishnan 2000). According to Eisenhardt and Martin (2000b), "dynamic capabilities thus are the organisational and strategic routines by which firms achieve new resources configurations as markets emerge, collide, split, evolve and die" (p.1107). From these arguments, it is clear that dynamic capability is

not an *ad hoc* response to change; instead, it is a deliberate and persistent effort to learn, acquire, and reconfigure new resources and capabilities to develop and sustain competitive advantage (Ambrosini, Bowman & Collier 2009; Salvato & Vassolo 2018). Different types of dynamic capabilities exist, and from the description given in the literature, it is difficult to segregate which dynamic capabilities are more appropriate for which aspect of resource stock.

A deeper review of the dynamic capabilities literature reveals that ACAP and NCAP are two inter-related but distinct capabilities of SMEs that play a key role in developing their competitive performance in a dynamic environment (Cheng, Niu & Niu 2014; Flatten, Greve & Brettel 2011; Huang & Rice 2009; Scuotto, Del Giudice & Carayannis 2017).

2.5.1 Absorptive Capacity

There is a vast literature that declares ACAP a critical dynamic capability that provides a firm with sustainable competitive advantage in knowledge-based competition, characterised by knowledge creation and utilisation (Malhotra, Gosain & Sawy 2005; Rodríguez-Serrano & Martín-Armario 2019; Zahra & George 2002). Cohen and Levinthal (1990), in their seminal article, defined ACAP as the "ability of the firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends by using firm's level of prior related knowledge" (p.128). Mowery and Oxley (1995) defined ACAP as a set of skills required to modify and manage the transferred knowledge in the firm. Lane and Lubatkin (1998) found ACAP to be a capacity of a firm to absorb knowledge from external firms. Later, and building on this perspective, Zahra and George (2002) defined ACAP as "a set of organisational routines by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organisational capacity" (p.186) and categorised it into two categories: potential ACAP' and 'realised ACAP'. Potential ACAP is required for

acquisition and assimilation, whereas realised ACAP is needed for transformation and exploitation of external knowledge. To develop a sustainable competitive advantage and achieve competitive performance, firms must excel on both dimensions (Zahra & George 2002).

Since its inception, ACAP has been defined differently by scholars. However, there are a few elements identified by almost every author. For instance, ACAP is a dynamic capability that deals with acquisition and utilisation of external knowledge, it is developed cumulatively within the firm, it is based on firm's prior knowledge, and it is a strong determinant of competitive performance. From these points, it can be inferred that ACAP is a dynamic capability that firms accumulate by using existing knowledge to acquire, integrate, and exploit new knowledge to enhance competitiveness. This description portrays a firm as a collection of knowledge-based resources and learning capabilities that enable it to acquire and create new knowledge through continued learning from and interaction with external knowledge sources (Camisón & Forés 2010; Cohen & Levinthal 1990).

Another assumption embedded in this view is that firms are operating in a dynamic environment where existing technologies and capabilities become quickly obsolete and, thus, there is always a need to explore and exploit new technological knowledge. This requires firms to effectively redefine and redeploy their knowledge-based resources to be more amenable to change and reshape existing knowledge-based resources (Flatten, Greve & Brettel 2011). ACAP, in this regard, determines how efficiently and effectively a firm can acquire, integrate and exploit new knowledge. However, literature indicates that firms differ in terms of their ACAP and consequent ability to produce innovative and market-relevant products and services. Firms with a high level of ACAP efficiently identify opportunities in the market, learn and transfer

new technological knowledge from external sources, develop innovative products, and exploit new market opportunities (Lichtenthaler 2009) and eventually obtain superior performance (Camisón & Forés 2010; Malhotra, Gosain & Sawy 2005; Wales, Parida & Patel 2013).

Szulanski (1996) found ACAP to be a critical factor for the successful transference of technological knowledge in the organisation. Cockburn and Henderson (1998) found a direct relationship between firms' ACAP and their access to and usage of public laboratories. García-Morales, Ruiz-Moreno and Llorens-Montes (2007) report that firms' 'technology ACAP' positively influenced the acquisition and transference of external technological knowledge and best practices, and thus enhanced innovation performance. These findings draw important inferences for this study because technological knowledge and laboratory-based research and development are two core services of the CFC program that are critical for innovation competitiveness among manufacturing sector SMEs of Pakistan.

2.5.2 Networking Capability

Networking capability of a firm has been widely recognised to be a critical dynamic capability (de Felice 2014; Voudouris et al. 2012) and a distinct source of firm competitiveness (Li, Zubielqui & O'Connor 2015; Nishimura & Okamuro 2011; Ozkan-Canbolat & Beraha 2016). It usually refers to the ability of a firm to develop, maintain, and utilise inter-organisational relationships to gain access to and advantage from the resources held by external constituencies (Parida et al. 2017; Walter, Auer & Ritter 2006). It determines a firm's ability to build and manage relationships with external entities and then use those links to build capabilities to exploit opportunities (Vesalainen & Hakala 2014). Walter, Auer and Ritter (2006) argue that the development and exploitation of a productive network requires a range of capabilities to build effective relationships, coordinate with collaborators, gather structured

information about competitors and collaborators, and establish internal communication channels to foster learning. Networking capabilities are critical to successfully form and manage networks because actors usually join or invest in those networks where sharing and receiving of information and knowledge takes place efficiently and yields more innovation benefits (Laursen & Salter 2006; Parida & Örtqvist 2015). The relationship between networks and networking capabilities work reciprocally, where a firm's existing networking capability is complemented by the knowledge endowed by external sources, which eventually strengthens that firm's overall network capability to participate and acquire knowledge in the network.

Through strong networking capabilities, firms get easy and quick access to critical knowledge and resources that are otherwise difficult or expensive to obtain (Brekke 2015). Networking provides a valuable resource base where firms share and seek information about new technologies, production methods, product development, and market opportunities, which help them develop innovative and market-relevant products to gain competitive advantage (Andersson, Evers & Griot 2013; Bouncken, Pesch & Reuschl 2016; Musteen, Francis & Datta 2010). Networks provide firms with an opportunity to build technological and innovative capabilities through continuous interaction and collective learning, which enhances their innovation performance (Ozkan-Canbolat & Beraha 2016). Access to other knowledge sources in the network also enables firms to obtain knowledge to resolve production and product development issues (Acosta, Crespo & Agudo 2018; Dougherty & Hardy 1996). Strong networks and networking capabilities also help domestic firms to quickly enter into international markets by seeking the required information and knowledge from network actors (Oviatt & McDougall 2005; Tehseen et al. 2019). Kale, Dyer and Singh (2002) argue that access to networks alone does not bring benefits instead it depends upon a firm's

ability to integrate its strategic and operational activities with network actors to harness superior benefits. Firms participating in networks must be open to share and receive even sometimes secret information to maintain mutuality and equal exchange of benefits (Hagedoorn, Roijakkers & Kranenburg 2006; Hossain & Kauranen 2016). Network development also creates challenges for participating firms, as sometimes, participating firms do not possess the required experience and competencies to match the pace of network actors and implement new technologies or processes (Dollinger & Golden 1992; Soto-Acosta, Popa & Palacios-Marqués 2017). Therefore, firms' capacity to establish and exploit networks largely differs due to their long-term investment orientation and networking capabilities (Caloghirou, Kastelli & Tsakanikas 2004; Galkina & Chetty 2015; Li, Zubielqui & O'Connor 2015).

SMEs, due to inherent resource disadvantage, rarely carry out technological and product innovation activities alone, and instead form technology and innovative networks, strategic alliances, and joint research and development activities (Freeman & Hagedoorn 1994; Gronum, Verreynne & Kastelle 2012; Mohannak 2007; Parida et al. 2017). SMEs also use networks to build their technological and innovative capabilities to identify and implement technology and product innovations (Mohannak 2007; Parida & Örtqvist 2015).

Therefore, NCAP is critical for SMEs acquiring resources from the CFC program and exploiting them to improve competitiveness. The CFC program provides technological knowledge and skills, which SMEs use to improve their production technologies and processes, innovation rate, product quality, and national and international market access. However, this process is long term and based on multiple incremental and radical changes in production technologies and processes, product development routines, research and development activities, and marketing and distribution

strategies (Madrid-Guijarro, Garcia & Van Auken 2009). This process also requires an upgrade in the technological and innovation capabilities of SMEs' human capital to effectively undertake and manage innovation and change processes (Kotabe, Jiang & Murray 2014). Given the inherent resources and capabilities disadvantage experienced by Pakistani SMEs, it seems unlikely that these firms, with their little existing technological and internationalisation knowledge and capabilities, will alone be able to convert the CFC's resource stock into a competitive advantage. For instance, production and product innovation may require SMEs to depart from existing technologies, processes and products. To successfully undertake this transformation, they may further need technical information and knowledge and financial support from suppliers, customers, partners and financial institutions (Laursen & Salter 2006; Vareska et al. 2009). Lack of information and experience about cheap and quality raw material, technology sourcing and alternatives, legal and financial implications, export procedures, and best production practices seem to lower SME capacity to cost-effectively acquire and implement technological knowledge and skills provided by the CFC. In addition, innovation always involves the cost of experimentation, time for product development, and the element of risk of failure (Terziovski 2010) which Pakistani SMEs mostly avoid (Shah, Javed & Syed 2013). SMEs with NCAP substantially reduce the risk involved in experimentation, the cost associated with information search, and product development cycle time (Dieleman & Sachs 2008; March-Chorda, Gunasekaran & Lloria-Aramburo 2002).

2.6 DEFINITION AND MEASUREMENT OF FIRM-LEVEL COMPETITIVENESS

During the past decade, support programs for clustered SMEs have been widely acknowledged as an effective tool to overcome SME resource limitations and improve their productivity, innovation, and competitiveness (Aleksandar, Koh & Leslie 2007;

Bhawsar & Chattopadhyay 2015b; Martínez-Del-Río & Céspedes-Lorente 2014). The term ‘cluster’ has been almost always associated with competitiveness—be it country, industry, or firm (Gnyawali & Srivastava 2013; Porter 2000). Evidence from developed countries largely show that the cluster phenomenon has generated a positive impact on national and regional competitiveness; however, its contribution toward firm competitiveness has been rarely investigated (Karaev & Szamosi 2007; Vlachvei & Notta 2016). Substantial research has been conducted to explain and evaluate the competitiveness of firms in clusters. However, the literature lacks consensus as to how the competitiveness of a firm should be defined and measured, which has left this concept elusive and misunderstood. A review of the literature indicates that competitiveness is a multidimensional and relative concept that has been defined from multiple perspectives depending on the discipline and level of investigation (Ajitabh & Momaya 2003; Vilanova, Lozano & Arenas 2009; Waheeduzzaman & Ryans Jr 1996).

With regards to definitions, Rugman and D'cruz (1993) define competitiveness as an ability of the firm to design, produce and/or market products better than the competitors in terms of price and non-price quality dimensions. According to Krugman (1996), competitiveness is the ability of a firm to compete in international markets. Murtha and Lenway (1994) defined competitiveness as a firm’s economic strength in comparison to its competitors in the global and free market. Chikán (2008) defines competitiveness as the capability of a firm to successfully meet customer expectations while staying sustainably profitable. Garelli (2012) views competitiveness as an ability of the nation and the firm to manage their competencies to make profits and remain prosperous. Cetindamar and Kilitcioglu (2013) assert that competitiveness is a capability of a firm that realises its potential in everyday operations. Although there is variation in their definitions of competitiveness, scholars largely agree that

competitiveness is a relative concept that defines a firm's ability to perform better than rivals across every aspect of the business.

With respect to the measurement of firm competitiveness, multiple frameworks, models, and measures have been used depending on the context and perspective from which one has approached the phenomenon. However, framing and evaluation of competitiveness at the firm level, in a way that is helpful for policy development or strategy formulation has been a challenge (Cetindamar & Kilitcioglu 2013; Oral, Cinar & Chabchoub 1999). Most studies have used a single measure or a few indicators to measure competitiveness, whereas arguments show that it is a complex and multidimensional phenomenon that should be measured with respect to its unique scope and context and by applying a multifaceted framework or multiple variables (Ajitabh & Momaya 2003; Chaudhuri & Ray 1997; Depperu & Cerrato 2005; Flanagan et al. 2007; Vlachvei & Notta 2016). Martin, Mayer and Mayneris (2011), in their impact assessment of a cluster policy on firm competitiveness, used total factor productivity, firm employment and firm exports to measure the impact.

Measurement of SME support program effectiveness with respect to competitiveness effects is challenging (Cetindamar & Kilitcioglu 2013; Vlachvei & Notta 2016) because some components of the program may have an effect on firm growth, innovation, profit, and international performance. Measurement thus needs a careful selection of the outcomes for evaluation (Storey 2008). In the case of the CFC, the program intends to affect all these outcomes and therefore is an important decision to select the relevant dimension of competitiveness to identify the program's effectiveness with higher precision. In the academic and policy literature, there is no theoretical or practical framework/model available for the measurement of competitiveness of firms in general, or manufacturing sector SMEs specifically (Bhawsar & Chattopadhyay

2015b; Cetindamar & Kilitcioglu 2013). Ajitabh and Momaya (2003), in their detailed review of theory, models, and frameworks of firm-level competitiveness, concluded that a lack of understanding about the competitiveness process may be a prime reason for the poor competitiveness of firms. According to these authors, competitiveness is the result of a firm's human resources, operations, and technology management processes that lead to a competitive advantage. Thus, Ajitabh and Momoya (2003) advise that the best way to approach firm competitiveness is to use a model that integrates and links competitive processes and competitive performance.

It can therefore be inferred that measurement of firm competitiveness is an important debate in the contemporary literature and therefore requires further deliberation before researchers use it in their studies (Liučvaitienė et al. 2013; Sirikrai & Tang 2006). Christensen, Lämmer-Gamp and Meier zu Kocker (2012) recently asserted that any single measure or indicator is simply inappropriate for the measurement of a support program or initiative. Similarly, Lämmer-Gamp, zu Kôcker and Christensen (2011), while endorsing this point, further advised that the selection of measurement criteria should be merely made on the basis of the objectives and context of the individual program or initiative. This seems possible only when all the salient factors for which a support program exists will be considered while measuring its effectiveness (Oldsman & Hallberg 2004). Booysen (2002) and Bhawsar and Chattopadhyay (2015b) argue that competitiveness should include all the factors that lead an entity to the success. Though their arguments contain confusion regarding the interpretation of success, they at least give an indication of the importance of considering more than one critical aspect of competitiveness for its measurement. Liučvaitienė et al. (2013) argue that the competitiveness of firms is determined by different economic, technological, and social factors— evaluation of which requires a coherent approach. They further assert

that the measurement of competitiveness alone is simply not enough; instead evaluation design and data must provide ways for governments and SMEs to improve competitiveness.

Accordingly, this study assumes that given the nature of the CFC program and insights for the literature, it is imperative to take a multidimensional perspective and include production, technology adoption, innovation, internationalisation, and market return as dimensions of manufacturing sector SME competitiveness (Coates & McDermott 2002; Hoskisson et al. 1999; Sirikrai & Tang 2006). The CFC program has been designed specifically to enhance technological and production capabilities of firms, which, in turn, will produce other economic benefits and returns. All these references provide substantial arguments and evidence to measure CFC assisted SME competitiveness from multiple aspects — especially through operational and technological indicators (Sirikrai & Tang 2006). Demeter (2003) asserts that improvement in production quality, the number of new or improved products produced, production time and cost are the salient components of an organisation's overall competitive performance. Empirical evidence confirms the statistically significant positive impact of new process technologies, process efficiency improvement, and total quality program on the performance of manufacturing sector firms (Ahmed, Montagno & Firenze 1996; Imran, Hamid & Aziz 2018; Inman et al. 2011; Morita & Flynn 1997). Specifically, the acquisition of advanced scientific equipment, adoption of advanced manufacturing technologies, development of new designs and products, and establishing cost-efficient production process contribute substantially to SME competitiveness (Anderson & Sohal 1999; Bellucci, Pennacchio & Zazzaro 2019; Cho, Leem & Shin 2008; Gordon & Sohal 2001; Sharma & Fisher 1997). Schayek and Dvir (2011), who studied the impact of a public assistance program on small business

outcomes, argued that inclusion of operational measures along with financial measures enhance the validity of the measurement of any assistance program's effect.

Therefore, this study tends to deploy multidimensional criteria to measure the competitiveness of beneficiary firms of the CFC program. This is important because to enrich theory and produce reliable evidence it is necessary to use frameworks that will be useful both for researchers and practitioners.

2.7 SME SECTOR OF PAKISTAN

Small and Medium Enterprises (SMEs) form the largest and most significant sector of Pakistan's economy. According to SMEDA-Pakistan, there are 3.2 million SMEs that account for nearly 98% of total enterprises and contribute 30% to GDP, 25% to exports, and 78% to industrial employment which warrants their critical role in the economic development process of the country. Private sector SMEs employ nearly 78% of the non-agriculture workforce. Collectively, SME sector contributes an estimated 40% to GDP, 35% in value addition, and over 40% to exports which establishes its key role in economic development process of the country (Khawaja 2006; Munir & Khan 2011; Raheman et al. 2010).

Pakistan is composed of four provinces, where Punjab province, being the largest by population, hosts around 65% percent or 1.9 million enterprises, followed by Sindh, KPK and Balochistan with a share of 18%, 14%, and 2% respectively. SME sector is not a formally organized sector and around 96% enterprises are owned/managed by sole proprietors / individuals, followed by 2% partnerships, and hardly any corporation. Most SMEs operate with traditional technologies and products which is the reason of their limited life cycle as only 4% SMEs could survive beyond 25 years (Khawaja 2006).

With respect to manufacturing sector SMEs, they contribute nearly 29% of the total value of manufacturing sector of the country with approximately 34 billion rupees per annum to GDP. They employ more than 1.2 million persons, whereas the total labour force in the manufacturing sector is around 1.8 million persons. Hence, they account for approximately 70% of total labour force in the manufacturing sector. The number of manufacturing SME in the country is over 400,000, whereas the number of all other units is less than 10,000. Hence SMEs constitute more than 98% of total number of manufacturing units (Gallup-Pakistan 2004).

The manufacturing SME can be broadly classified into 1) approximately 160,000 *household units* –which operate from the dwelling of their owner, mostly employing the family members of the owner, and 2) 265,000 *small units* –which do not operate from the residential dwelling of their owner. Small units contain less than 10 employees are not registered under the Factories Act. Of the total manufacturing SMEs, 41 % operate in urban areas whereas the rest 59% belong to rural areas. The majority of household units are in rural areas, whereas the majority of small and medium units are in the urban areas. Among household units the 78% are in rural (125,000 units) whereas 22% (35,000 units) in urban areas. Small units are 47% rural (125,000 units) and 53% urban (140,000 units). According to the study conducted by Gallup-Pakistan (2004) with the cooperation of World Bank and the Government of Pakistan, the top ten problems being faced by SMEs are;

1- Lack of Finance 55%

2- Shortage of skilled labour 39%

3- Getting business site 38%

4- Bribe 21%

5- Orders/Marketing of product 28%

6- Lack of knowledge 12%

7- Government interference 12%

8- Getting quality Raw material 10%

9- Getting license for work 8%

10- Knowledge of new Technology 8%

In early 2000s, the government realized the potential of SMEs sector in country's economy and the need for a concrete and focused support from the government to facilitate the trajectory of sector's growth. Resultantly, the government of Pakistan introduced SME Policy in 2007 to strengthen this sector by forming a strategic framework to establish a conducive entrepreneurial and economic environment for the upgradation and competitiveness of SMEs sector. The policy framework identified key priority areas such as financial accessibility, spurred human development, technological up-gradation and a healthy business environment that impeded the competitiveness of SMEs during the past decades especially in the international markets.

Despite the policy and financial support, the SME sector in Pakistan is still constrained by many interrelated bottlenecks such as limited finances, little technical support, low human resource, lack of management and organization skills, and low technological innovation in the area of manufacturing and product development. This mainly emerges from the limited options available to SMEs to invest in HRD, technology and exploration of new markets. As a result, the SME sector in Pakistan is usually engaged in low value-added manufacturing using inefficient labour, outdated production technologies, and operating in limited and traditional markets. The sector neither possesses the financial strength nor the collective wisdom to climb its way out of this

'low equilibrium' enterprise activity. The poor national performance on the Human Development Index of the UN has its consequences for SMEs in Pakistan. These include inadequate and generic education and insufficient, poorly focused and under-serving training infrastructure. SMEs mostly draw their human resource (including the owners) from either the higher education institutions or the technical training infrastructure, both of which are not attuned to the SME needs nor are they equipped to address them. This situation limits the capacity and capability of SMEs to innovate, add value, upgrade technology and devise new marketing strategies **(**Shahzad, 2015).

The SME sector mainly operates on traditional and relatively low technology, which is less cost and time efficient. The quality of products is also relatively less competitive, which is less likely to compete in international market to improve exports or substitute imports. Weak system of technology transfer also prevails in SME sector with low research and development (R&D) investments.

SMEs sector also lacks a strong managerial structure which serves as an obstacle to its smooth performance and success. The managers do not possess the necessary skills and expertise in running the affairs of the business and often lead the business towards failure. In Pakistan, the opportunities of skills training and vocational education are a handful which further aggravates the predicament faced by SMEs. The Gallup (2004) survey reveals that 40% small enterprises train shagirds, who later start their own ventures by taking experience from firms. Research studies have repeatedly asserted that SMEs performance in Pakistan is negatively affected by; lack of systematic knowledge, outdated technological infrastructure, and poor capabilities of workforce (Aftab & Rahim 1986; Mustaghis-ur-Rahman, Stough, & Jalees 2015).

A typical SME in Pakistan caters to the domestic private sector and their activities are mostly concentrated in some specific regions. SMEs have less access to information and communication channels; and they face difficulties complying with labor, environmental, social, and international standards therefore, operate in domestic or limited markets **(**Shahzad, 2015).

2.8 COMPETITIVENESS OF SMES IN PAKISTAN

The SME sector is a major carrier of employment, investment and GDP share in Pakistan (Jasra et al. 2012). However, the growth of SMEs compared with large-scale organisations in Pakistan has been far below than their regional competitors (Bari, Cheema & Ehsan-ul-Haque 2005; Khattak, Arslan & Umair 2011; Khawaja 2006). Given the fact that SMEs constitute a majority of Pakistan's businesses, the contribution of the SME sector into the country's overall gross domestic product (GDP) and gross national product (GNP) has not been promising compared to neighbouring countries and the world (Bari, Cheema & Ehsan-ul-Haque 2005). Scholars argue that the growth and competitiveness of SMEs, especially in developing countries like Pakistan, is inextricably linked with state-of-the-art technology, availability of trained human resources, innovation, and productivity improvement (Abd-Rahman & Bennett 2009; Krammer, Strange & Lashitew 2018; Marri, Irani & Gunasekaran 2007).

Due to increasing expansion of multinational firms in Pakistan, domestic SMEs are under pressure to compete with those firms, albeit mostly in the domain of products. For instance, Pakistan's bottled water market, valued at USD 274.6 million in 2018, is estimated to reach USD 451.57 million by 2024 with a growth rate of 10.46%[2]. There are more than 50 players operating in this market; however, the majority are domestic

[2] https://www.mordorintelligence.com/industry-reports/pakistan-bottled-water-market

and SMEs and have to compete with international giants such as Coca-Cola Company, Nestle, PepsiCo. Similarly, many domestic beverages companies have to compete with PEPSI Cola, Nestle and Coca-Cola to sustain their market share.

According to an empirical study conducted by Tipu and Fantazy (2014), Pakistani SMEs lag behind in their supply chain strategy and flexibility, innovation and customer-service orientation as they tend to adopt a follower strategy instead of leading the competition. Shah, Javed and Syed (2013), in their analysis of six research papers, identified that government support, research and innovation, development of export industry, and entrepreneurial relationships are the key factors driving the internationalisation process in SMEs. However, SMEs have not been successful in their internationalisation endeavours due to lack of infrastructure, insufficient finances, inadequate research facilities, lack of sound economic policies and international trade barriers. Marri, Gunasekaran and Sohag (2007) concluded that Pakistani SMEs severely lack vision, orientation, and expertise to learn and adopt new technologies and expand into international markets. Khattak, Arslan and Umair (2011) and Mahmood (2006) found that the major competitiveness challenges faced by Pakistani SMEs include inefficient and ill-designed production technology resulting in huge energy waste, use of sub-standard raw materials, limited testing facilities for raw materials and finished products, workers inadequately qualified for technical jobs, old-fashioned and cost-inefficient designs, and long delays in production and bringing new products into the market. This situation over time has resulted in poor productivity and diversification in manufacturing technologies and products in Pakistani SMEs, which has been making them less competitive in international and domestic markets (Junejo, Rohra & Kanasro 2009).

According to the United Nations Development Program's (UNDP) Human Capital Index (HDI) report, in 2015 Pakistan was ranked as a 'medium' human development country—ranked 147 out of 188 countries and territories (Jahan 2016). This relatively low human capital index is affecting SME competitiveness as Pakistani SMEs have been repeatedly reported as less innovative, dynamic, productive, and competitive (Khaliqueet al. 2011; Subhan, Mahmood & Sattar 2014). According to the recent Global Innovation Index 2016, Pakistan stands at 119 out of 128 countries scoring 22.6 out of 100 in terms of its innovative orientation and output (Dutta, Lanvin & Wunsch-Vincent 2016). Furthermore, the World Economic Forum's *2015–2016 Global Competitiveness Report* and *Global Information Technology Report* reveals that Pakistan, the second largest country in South Asia, has been consistently performing poorly on all critical determinants of competitiveness (World Economic Forum 2015, 2016). According to these reports, the historical performance of Pakistan has been disappointing; from 2006 to 2013, Pakistan dropped 28 positions on its competitiveness ranking, which is the 4th biggest decline among all countries included in the study's population. It is also alarming that Pakistan has been performing consistently poorly in comparison to developing countries of the Asian region, especially its regional competitors including China, India, Bangladesh, and Sri Lanka.

Table 2.1 provides ranking and respective scores of Pakistan against critical determinants of competitiveness during 2018–2019[3]. Original reports published by the World Economic Forum encompass an exhaustive list of critical areas for competitiveness; however, the following table contains factors most critical for SME competitiveness and performance.

[3] The world Economic Forum report is available and can be downloaded from www.weforum.org/gcr.

Table 2.1: Pakistan's Ranking in Global Competitiveness Index (2018–2019)

Sr. No.	Category	Ranking 2018-2019
1	Overall Competitiveness	110
2	Institutions	107
3	Infrastructure	105
4	ICT Adoption	131
5	Macro-economic Stability	116
6	Health	115
7	Skills	125
8	Product Market	126
9	Labour Market	120
10	Financial System	99
11	Market Size	29
12	Business Dynamism	52
13	Innovation Capability	79

Source: The Global Competitiveness Report 2019.

To overcome the challenge of industrial and SME competitiveness, Pakistan has started offering initiatives to provide SMEs with improved technological infrastructure that presumably appears to be critical for competitiveness (Shahzad 2015). The GOP, in this regard, has taken serious steps by establishing a special SME Task Force and comprehensive SME policy to achieve economic revival, poverty alleviation, and employment generation especially through the development of its export-oriented SMEs (Berry 1999). Scholars and experts believe that through the provision of adequate support systems (i.e., government interventions), the GOP can improve SMEs capabilities for technological and product innovation to compete in domestic and international markets (Berry 1999; Krammer, Strange & Lashitew 2018; Marri, Gunasekaran & Sohag 2007).

To improve the country's competitiveness, the GOP is aiming to increase the productivity and competitiveness of its SME sector by promoting basic determinants of their competitiveness. SMEs in Pakistan lack technological infrastructure and capabilities to innovate, upgrade technologies, add value, improve/introduce new products, and enter into international markets (Mubarik, Govindaraju & Devadason 2016; Nadeem, Faheem & Ali 2010). This has hindered the growth potential of SMEs, abated GDP and export growth, and nurtured a culture of non-competition, which now in the wake of globalisation is posing serious threats to the survival and competitiveness of SME sector (Iqbal, Hameed & Devi 2012). Due to the emergence of globalisation and free market structures, export-oriented SMEs are specifically exposed to increasing growth and competitiveness challenges (Iqbal, Hameed & Devi 2012). Within the Asian region, Pakistan has been among the major labour-intensive players in international markets, with the largest portion of manufacturing-related products. However, Pakistani manufacturing industries and SMEs are facing severe competition and challenges of reducing production costs and introducing innovative products that meet international standards (Saheed 2011). This situation calls for increased ability of SMEs to enhance production efficiency, reduce product prices, improve process quality, and introduce new products (Raymond & St-Pierre 2010). Achievement of production excellence and higher innovation depends on the ability of SMEs to adopt and implement advanced technological knowledge and organisational skills (Rivera, Sheffi & Knoppen 2016). However, there is a severe deficiency of expertise and orientation for research and technological developments among Pakistani SMEs, so most firms still rely on conventional production methods and business practices (Mubarik, Govindaraju & Devadason 2016).

2.9 CFC PROGRAM OF GOVERNMENT OF PAKISTAN

In 2001, the GOP, in technical and financial collaboration with national and international development agencies, established an SME Sector Development Program. With an initial start-up budget of US $12 million and a total estimated budget of US $280 million, a CFC program was introduced in 2002 to establish up to 50 such centers all over Pakistan during the next five years. The main purpose of this program was to strengthen the capacities of SME clusters in the country and facilitate the development of the SME sector. Under this program, CFCs were established to provide a common pool of targeted technologies, technical training and consultancies, testing and inspection services, and process/technology-related services for the collective up-gradation of SMEs. Table 2.2 includes detail of demographics and operations of some leading CFC projects.

Table 2.2: Operational Detail of Leading CFC Projects

Project Info	Facilities and Services for SMEs
Project Name: Dyeing, Washing & Pressing CFC for Silk Cluster Location: Mingora, Swat, Khyber Pakhtunkhwa Estimated Cost: Rs. 57.53 Million Project Life Start Date: July 2010 Completion Date: October 2017 Current Status: Project Completed and is now Operational.	- Provision of machinery for business purposes at nominal charges - Training services to enable Washing / Dyeing / Pressing capabilities - Training services to enable Designing / Branding & Marketing capabilities - Training services to assist in Costing, Management, Book Keeping
Project Name: Establishment of Spinning CFC Location: Swat, Khyber Pakhtunkhwa Estimated Cost: Rs. 29.697 Million Project Life	- Card Machine - Ring Machine - Rack Machine - Winder

Start Date: July 2010 Completion Date: June 2014 Duration: 4 years Project Status: Project partially executed	
Foundry Service Centre - Lahore	Design and Casting Simulation Services - Computerized Patternmaking - Conventional Machining - Prototype Production - Materials Testing & Inspection - Casting Crack Detection - Sand Testing - Physical Testing - Chemical Analysis - Metallographic Testing - Consultancy Services - Floor shop level/ Industrial visit - Training Services - Melting and Casting Facilities
Project Name: Honey Processing & Packaging Common Facility Centre Location: Mingora, Swat, Khayber Pakhtunkhwa Estimated Cost: Rs. 38.17 Million Project Life Start Date: July 2010 Completion Date: October 2017 Current Status: Project Completed and is now Operational.	- Sophisticated equipment to process apiary as well as forest honey - Production of refined high-quality honey for bulk consumption - Modern processing @ Rs. 6/Kg and packaging @ Rs. 3/Kg - Capacity to process approximately 2000 kg of honey in an 8 hour shift - Capacity to package1500-2000 bottles (1 kg)
Sports Industries Development Centre (SIDC) - Sialkot Project Name: Sports Industries Development Centre (SIDC), Sialkot Location: Sialkot, Punjab	- Manufacturing Facilities (manufacturing of Bladders, Basketballs, Thermo balls, Hybrid Ball, Volleyballs, American Balls, Rubber Nozzles and yarn winding of bladders) - Laboratory testing (all types of tests as per FIFA standards for thermo ball, basketball as per FIBA, bladder & raw materials)

Project Cost: Rs. 435.637 Million Current Status: Project Completed and is now Operational, Rendering Services to the Local Sports Goods Industry. SIDC is an ISO 9001:2015 QMS certified organization	- Workshop Facilities (all kinds of cutting Dies, Molds & some types of bending Dies) - Processing & reshaping of small and medium sized mold cavities as well as shaping of specialized high strength spare parts. - Advisory Services - Training of Manpower <u>ACHIEVEMENTS / OUTCOMES</u> Manufactured almost 1,600,000 bladders, 258,500/- yarn winding of bladders, 1,700,000/- Rubber Nozzles, 54,000 Thermo balls and 30,000 basketballs for the local industry up to December 2018. Volleyballs and American balls samples are also developed for the industry.
Project Name: Sialkot Business and Commerce Centre Location: Sialkot, Punjab Total Cost: Rs. 484.61 Million Partners: Sialkot Chamber of Commerce and Industry Current Status: Operational	- Exhibition Halls - Auditorium and Meeting Rooms - Business Incubation Offices - Residential Rooms - Business Facilitation Centre
Light Engineering Service Center (LESC)	- Physical Testing (Hardness Testing, Temperature - Measurement and Dynamic Balancing) - Material Testing (Chemical Analysis) - Carbon Sulphur Detector - Wet Analysis (Ferrous & Non Ferrous) - Designing (Auto Cad) - Training & Consulting
Leather Sports Goods	- Pattern Designing and Manufacturing - Grading - Marker Making - Training in manual pattern making and computerized pattern making
Agro Food Processing Facilities, Multan	- Fruit Processing (Mango Pulp, Guava Pulp)

Sponsor: Ministry of Industries & Production (MoI&P) Execution - SMEDA through Board of Management notified by Govt. of Pakistan.	- Vegetable Processing (Tomato Paste/Puree) - Fresh Fruit/Vegetable Grading and Packing - Consultancy Services
Revival of Cutlery Institute of Pakistan (CIP), Wazirabad	- Provision of Training Programs - Product Designing and Prototyping - Pilot production of a sample batch - Manufacturing of moulds and dies - Jobbing facilities for small precision parts. - Cluster Network Formation - Quality Assurance Advisory Role
Hyderabad Engineering Support Centre	- Design, development and manufacture of tools & products, plastic and metal products manufacturing - Technical Services in conventional and CNC Machining, CAD/CAM and CAE solutions, Precision Grinding and Inspection - Technical literature, books, journals and engineering software - Technical Training and Consultancy - Testing & Quality Evaluation - Diploma Courses

Common facilities provided by CFCs are usually expensive which individual SMEs cannot afford in-house, which affects their ability to improve operational efficiency and offer competitive product lines. In other words, the specialized high-cost services and technologies offered/shared through CFCs are those which do not justify investments by a single enterprise. For example, the mango growing cluster in Multan was wasting tons of the mangoes every year due to unavailability of pulp plant. Football cluster in Sialkot was losing world market due to unavailability of the mechanised football manufacturing technology. Kunri's abundant production of Chilies were being contaminated due to unavailability of mechanical dehydration facility. In fact, all these

technologies were expensive and thus not affordable to the SMEs due to heavy cost. With the provision of CFC program, it was expected that SMEs would use these facilities for improving quality and value addition in their products and production processes that would improve their competitiveness. Similarly, Light Engineering sector is one of the leading industrial sectors in Pakistan famous for a number of metal related light engineering industries, which include Sanitary Fittings, Dies and Molds, Pumps and Motors, Auto Parts and components, Machinery and spare parts for sugar and other similar industries, Home Appliances, Metal utensils and Hardware items. Light Engineering SMEs currently lack capability of material selection, physical testing, material composition, components drawing making, heat treatment facilities, plating thickness, and Computer Aided Designing (CAD) skills which has constrained their ability to take full advantage of advanced manufacturing process.

The CFC program is a support mechanism to improve the technical infrastructure and technological resources and capabilities of those industries that have export potential, but due to out-dated technologies and skills have not kept pace with the international developments. Consequently, these industries have been less effective in bringing innovations in their processes and products to meet the ever-changing demands of international markets. According to experts and industry analysts, the revival of these industries depends on the infrastructural up-gradation, technological modernisation, and product innovation/diversification.

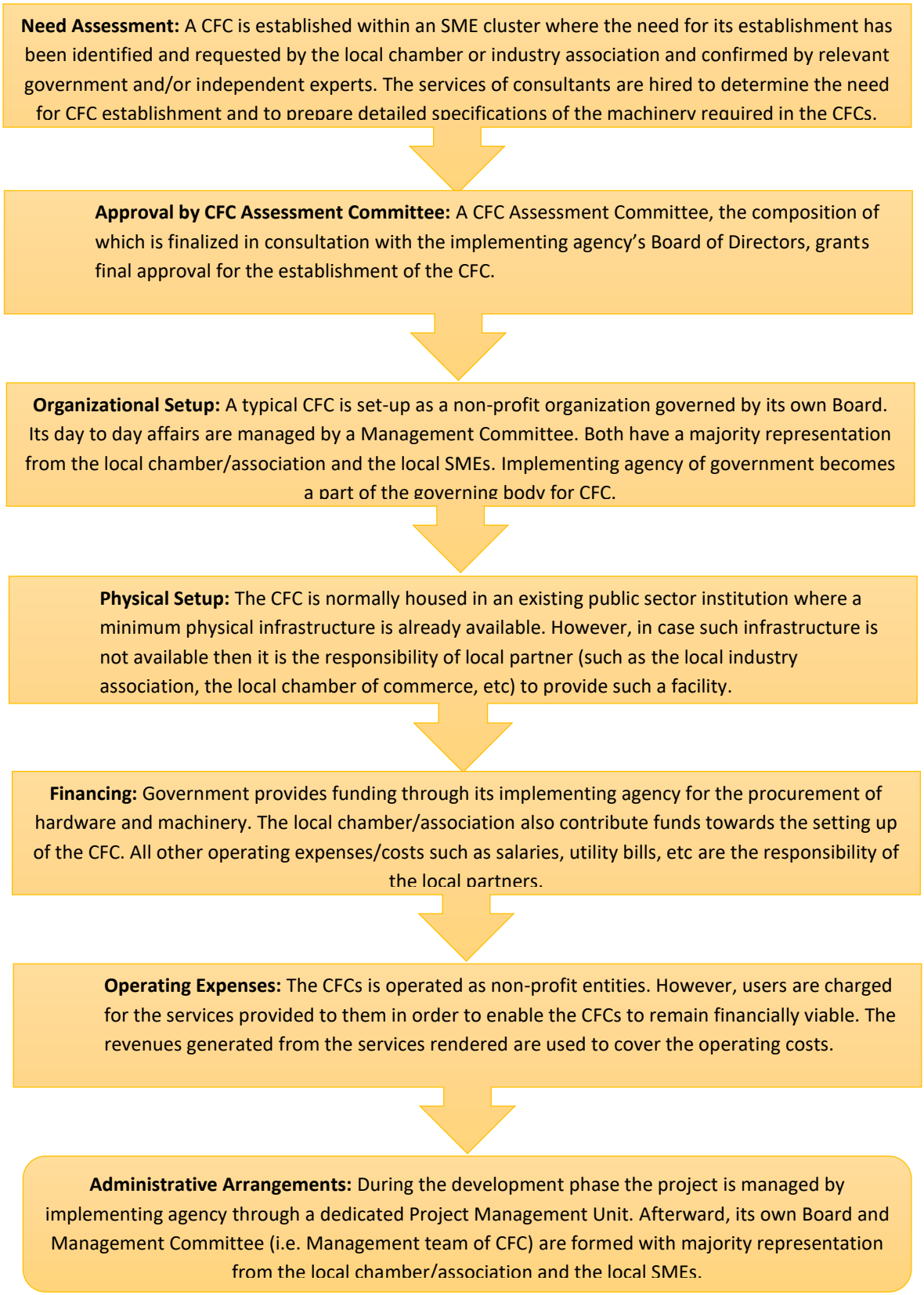
The provision of CFCs to promote industrial development and SME competitiveness has now become a vital part of the GOP's national economic and industrial development plan, and as a result, dozens of CFCs have been established in different industrial clusters across the country. In its functional domain, a CFC operates as an independent, autonomous, and formal organisation and offers: 1) a production facility

(for production of products), 2) technical training (for latest production and product development technologies and techniques), 3) consultancy (for latest production and processing techniques), 4) research and development (raw material testing and inspecting, laboratory, design development etc.), and 5) information sharing (about standards, exports, markets, technologies etc.). SMEs use these facilities and services for improving quality and value addition in their production processes and products, and to train their technical workforce on the targeted technologies to meet international standards and market requirements. The fundamental assumption behind this CFC program is that SME competitiveness and performance—be it domestic or international—largely depend on their technological capabilities, product development, production value-addition, and information about international markets (Bae 2015; Buratti & Penco 2001; Jun, Seo & Son 2012), which most Pakistani SMEs lack. Hence, the main objective of the GOP in establishing the CFC program is to enhance competitiveness and performance of its manufacturing sector SMEs in domestic as well as international markets by increasing their production, technological, innovation, and internationalisation capabilities.

CFC project is established after a delicate research and decision-making process. Figure 2.1 delineates the mechanism for establishing a typical CFC. A typical CFC is established within an SME cluster where the need for its establishment is identified. A request for a need assessment for a CFC is made by the local chamber or industry association to the GOP or its designated agency. The government undertakes an independent assessment to determine the need and requirement for machinery and a budget for further approval. The decision criteria for the approval of a CFC include, but are not limited to: benefitting a maximum number of SMEs, the demonstration of a clear need by local SMEs, contribution by the local chamber/association. A typical

CFC is set-up as a non-profit organisation governed by its own board. Day-to-day operations of CFCs are managed by a Management Committee. Both have a majority representation from the local chamber/association and the local SMEs. Figure 2.2 provides an example of the process of establishing governance body of CFC. CFCs are normally housed in an existing public sector institution where minimum physical infrastructure is already available. However, in cases where infrastructure is not available it is the responsibility of local partner (such as the local industry association, the local chamber of commerce) to provide such a facility. Although CFCs operate as non-profit entities, they charge for the services provided to SMEs to meet their operational expenses and future growth needs. Projected costing of CFC project at the time of its inception (year 2004) is shown in Table 2.3 through Table 2.7, whereas the combined 5 years costing is shown in Table 2.8. The costing could be modified as and when required, to achieve the intended objectives of the project, with the recommendation of the implementation agency, CFC project manager, and the board.

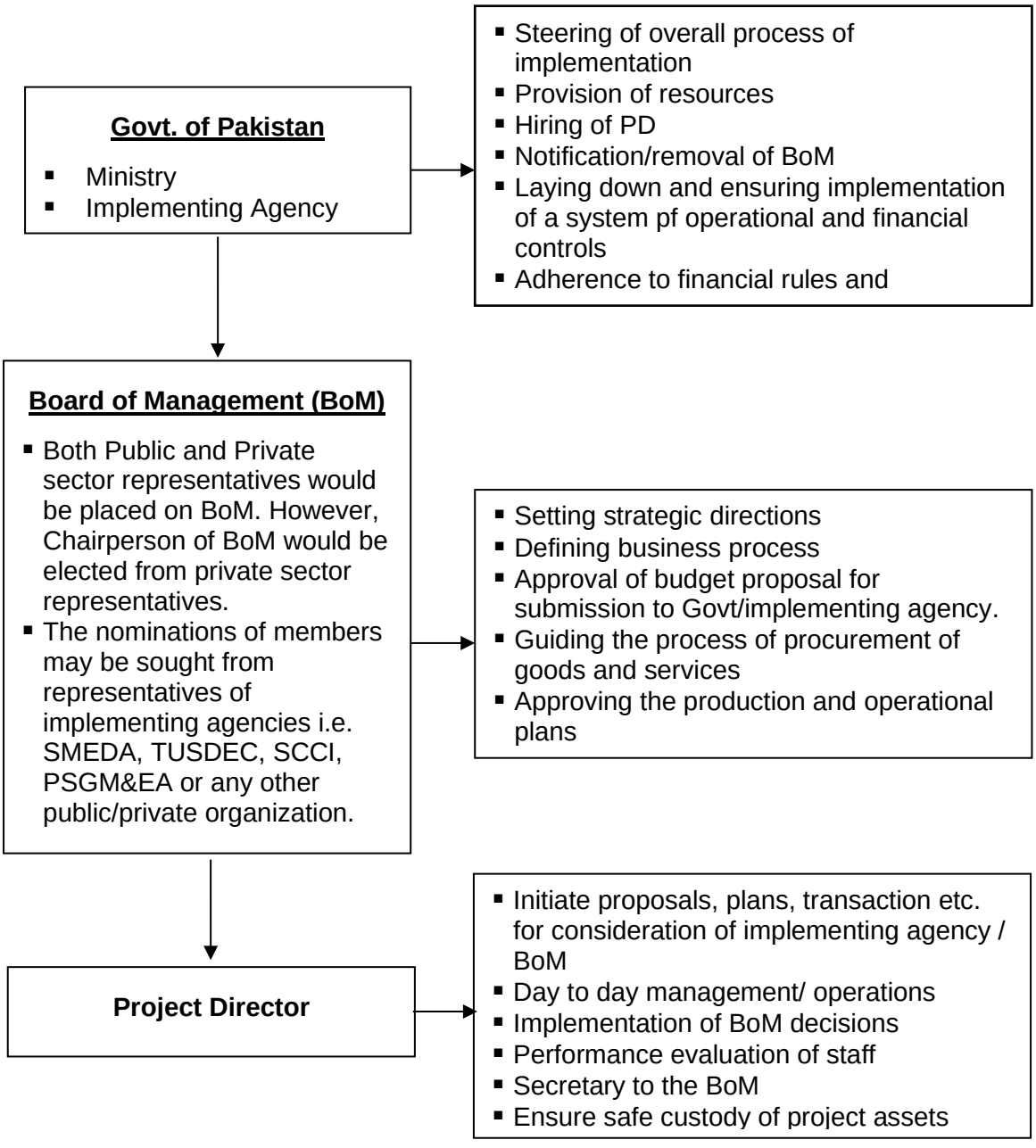
Figure 2.1: Mechanism for Establishing CFCs



Source: Extracted and drawn by the researcher from CFC literature collected from domestic and international development agencies

Figure 2.2: Establishment of Governance Mechanism of CFCs

The following structure is typically followed to resolve the governance issues and to ensure public / private partnership to the proposed CFC project.



Source: Extracted and drawn by the researcher from CFC literature collected from domestic and international development agencies

Table 2.3: Project Costing for Year 1

PROJECT COSTING_YEAR 1

Assumptions
1. In year_1 Five CFCs will be established. However proposals/specifications will be finalized for at least 10
2. 1 US$ = Pak. Rs. 59.00
3. Partial Staff hiring in Year_1. Full staff strength from Year_2 onwards

1. Cost of CFC _ Year 1	*Unit*	*Unit Cost (Rs.)*	*No. of Units*	*Total (Rs.)*	*Total ($)*
Average Cost of Machinery, Equipment, etc	Per CFC	4,000,000	5	20,000,000	338,983
Marketing & Advertising	Per CFC	300,000	5	1,500,000	25,424
Consultancy for developing detailed CFC proposals	Per CFC	500,000	10	5,000,000	84,746
				26,500,000	***449,153***
2. Recurring Expenses _ Year 1					
Project Director	Per Month	150,000	12	1,800,000	30,508
Assistant Project Managers (1 @ 50,000 p.m)	Per Month	50,000	12	600,000	10,169
Technology Specialists (2 @ 50,000 p.m)	Per Month	100,000	12	1,200,000	20,339
Legal Advisor	Per Month	60,000	12	720,000	12,203
Accountant	Per Month	25,000	12	300,000	5,085
Procurement Specialist	Per Month	50,000	12	600,000	10,169
Support Staff (2 @ 6,250 p.m)	Per Month	12,500	12	150,000	2,542
POL	Per Month	50,000	12	600,000	10,169
TA/DA etc.	Per Month	50,000	12	600,000	10,169
Travel	Per Month	50,000	12	600,000	10,169
Rent	Per Month	25,000	12	300,000	5,085
Utilities	Per Month	30,000	12	360,000	6,102
Office Overheads, Stationery, etc	Per Month	15,000	12	180,000	3,051
Contingencies	5% of the above			400,500	6,788
				8,410,500	***$ 142,551***
3. Capital Expenses					
Transport (2)				3,000,000	50,847
Computers & Office Equipment				1,000,000	16,949
Furniture & Fixtures				500,000	8,475
				4,500,000	***$ 76,271***
GRAND TOTAL _ YEAR 1			***Rs.***	***39,410,500***	***$ 667,975***

Source: Extracted by the researcher from CFC literature collected from multiple domestic and international development agencies and CFC projects

Table 2.4: Project Costing for Year 2

PROJECT COSTING_YEAR 2

Assumptions
1. In year_2 Ten CFCs will be established. Similarly proposals/specifications will be finalized for 13 CFCs
2. 1 US$ = Pak. Rs. 59.00
3. Annual Inflation of 10% has been assumed

1. Cost of CFC _ Year 2	*Unit*	*Unit Cost (Rs.)*	*No. of Units*	*Total (Rs.)*	*Total ($)*
Average Cost of Machinery, Equipment, etc	Per CFC	11,000,000	10	110,000,000	1,864,407
Marketing & Advertising	Per CFC	330,000	10	3,300,000	55,932
Consultancy for developing detailed CFC proposals	Per CFC	550,000	13	7,150,000	121,186
				120,450,000	***2,041,525***
2. Recurring Expenses _ Year 2					
Project Director	Per Month	165,000	12	1,980,000	33,559
Assistant Project Managers (2 @ 55,000 p.m)	Per Month	110,000	12	1,320,000	22,373
Technology Specialists (5 @ 55,000 p.m)	Per Month	275,000	12	3,300,000	55,932
Legal Advisor	Per Month	66,000	12	792,000	13,424
Accountant	Per Month	27,500	12	330,000	5,593
Procurement Specialist	Per Month	55,000	12	660,000	11,186
Support Staff (4 @ 6,875 p.m)	Per Month	27,500	12	330,000	5,593
POL	Per Month	55,000	12	660,000	11,186
TA/DA etc.	Per Month	55,000	12	660,000	11,186
Travel	Per Month	55,000	12	660,000	11,186
Rent	Per Month	27,500	12	330,000	5,593
Utilities	Per Month	33,000	12	396,000	6,712
Office Overheads, Stationery, etc	Per Month	16,500	12	198,000	3,356
Contingencies	5% of the above			580,800	9,844
				12,196,800	***$ 206,725***
3. Capital Expenses					
Transport (2)				-	-
Computers & Office Equipment				500,000	8,475
Furniture & Fixtures				500,000	8,475
				1,000,000	***16,949***
GRAND TOTAL _ YEAR 2			***Rs.***	***133,646,800***	***$ 2,265,200***

Source: Extracted by the researcher from CFC literature collected from multiple domestic and international development agencies and CFC projects

Table 2.5: Project Costing for Year 3

PROJECT COSTING_YEAR 3

Assumptions
1. In year_3 Thirteen CFCs will be established. Similarly proposals/specifications will be finalized for 12 CFCs
2. 1 US$ = Pak. Rs. 59.00
3. Annual Inflation of 10% has been assumed

1. Cost of CFC _ Year 3	*Unit*	*Unit Cost (Rs.)*	*No. of Units*	*Total (Rs.)*	*Total ($)*
Average Cost of Machinery, Equipment, etc	Per CFC	12,100,000	13	157,300,000	2,666,102
Marketing & Advertising	Per CFC	363,000	13	4,719,000	79,983
Consultancy for developing detailed CFC proposals	Per CFC	605,000	12	7,260,000	123,051
				169,279,000	***2,869,136***
2. Recurring Expenses _ Year 3					
Project Director	Per Month	181,500	12	2,178,000	36,915
Assistant Project Managers (2 @ 60,500 p.m)	Per Month	121,000	12	1,452,000	24,610
Technology Specialists (5 @ 60,500 p.m)	Per Month	302,500	12	3,630,000	61,525
Legal Advisor	Per Month	72,600	12	871,200	14,766
Accountant	Per Month	30,250	12	363,000	6,153
Procurement Specialist	Per Month	60,500	12	726,000	12,305
Support Staff (4 @ 7,562.5 p.m)	Per Month	30,250	12	363,000	6,153
POL	Per Month	60,500	12	726,000	12,305
TA/DA etc.	Per Month	60,500	12	726,000	12,305
Travel	Per Month	60,500	12	726,000	12,305
Rent	Per Month	30,250	12	363,000	6,153
Utilities	Per Month	36,300	12	435,600	7,383
Office Overheads, Stationery, etc	Per Month	18,150	12	217,800	3,692
Contingencies	5% of the above			638,880	10,828
				13,416,480	***$ 227,398***
3. Capital Expenses					
Transport (2)				-	-
Computers & Office Equipment				-	-
Furniture & Fixtures				-	-
				-	$ -
GRAND TOTAL _ YEAR 3				***Rs. 182,695,480***	***$ 3,096,534***

Source: Extracted by the researcher from CFC literature collected from multiple domestic and international development agencies and CFC projects

Table 2.6: Project Costing for Year 4

PROJECT COSTING_YEAR 4

Assumptions
1. In year_4 Twelve CFCs will be established. Similarly proposals/specifications will be finalized for 10 CFCs
2. 1 US$ = Pak. Rs. 59.00
3. Annual Inflation of 10% has been assumed

1. Cost of CFC _ Year 4	*Unit*	*Unit Cost (Rs.)*	*No. of Units*	*Total (Rs.)*	*Total ($)*
Average Cost of Machinery, Equipment, etc	Per CFC	13,310,000	12	159,720,000	2,707,119
Marketing & Advertising	Per CFC	399,300	12	4,791,600	81,214
Consultancy for developing detailed CFC proposals	Per CFC	665,500	10	6,655,000	112,797
				171,166,600	***2,901,129***
2. Recurring Expenses _ Year 4					
Project Director	Per Month	199,650	12	2,395,800	40,607
Assistant Project Managers (2 @ 66,550 p.m)	Per Month	133,100	12	1,597,200	27,071
Technology Specialists (5 @ 66,550 p.m)	Per Month	332,750	12	3,993,000	67,678
Legal Advisor	Per Month	79,860	12	958,320	16,243
Accountant	Per Month	33,275	12	399,300	6,768
Procurement Specialist	Per Month	66,550	12	798,600	13,536
Support Staff (4 @ 8,319 p.m)	Per Month	33,275	12	399,300	6,768
POL	Per Month	66,550	12	798,600	13,536
TA/DA etc.	Per Month	66,550	12	798,600	13,536
Travel	Per Month	66,550	12	798,600	13,536
Rent	Per Month	33,275	12	399,300	6,768
Utilities	Per Month	39,930	12	479,160	8,121
Office Overheads, Stationery, etc	Per Month	19,965	12	239,580	4,061
Contingencies	5% of the above			702,768	11,911
				14,758,128	***$ 250,138***
3. Capital Expenses					
Transport (2)				-	-
Computers & Office Equipment				-	-
Furniture & Fixtures				-	-
				-	$ -
GRAND TOTAL _ YEAR 4				***Rs. 185,924,728***	***$ 3,151,267***

Source: Extracted by the researcher from CFC literature collected from multiple domestic and international development agencies and CFC projects

Table 2.7: Project Costing for Year 5

PROJECT COSTING_YEAR 5

Assumptions
1. In year_4 Ten CFCs will be established. Similarly proposals/specifications will be finalized for 5 CFCs
2. 1 US$ = Pak. Rs. 59.00
3. Annual Inflation of 10% has been assumed

1. Cost of CFC _ Year 5	*Unit*	*Unit Cost (Rs.)*	*No. of Units*	*Total (Rs.)*	*Total ($)*
Average Cost of Machinery, Equipment, etc	Per CFC	14,641,000	10	146,410,000	2,481,525
Marketing & Advertising	Per CFC	439,230	10	4,392,300	74,446
Consultancy for developing detailed CFC proposals	Per CFC	732,050	5	3,660,250	62,038
				154,462,550	***2,618,009***
2. Recurring Expenses _ Year 5					
Project Director	Per Month	219,615	12	2,635,380	44,667
Assistant Project Managers (2 @ 73,205 p.m)	Per Month	146,410	12	1,756,920	29,778
Technology Specialists (5 @ 73,205 p.m)	Per Month	366,025	12	4,392,300	74,446
Legal Advisor	Per Month	87,846	12	1,054,152	17,867
Accountant	Per Month	36,603	12	439,230	7,445
Procurement Specialist	Per Month	73,205	12	878,460	14,889
Support Staff (4 @ 9,150 p.m)	Per Month	36,603	12	439,230	7,445
POL	Per Month	73,205	12	878,460	14,889
TA/DA etc.	Per Month	73,205	12	878,460	14,889
Travel	Per Month	73,205	12	878,460	14,889
Rent	Per Month	36,603	12	439,230	7,445
Utilities	Per Month	43,923	12	527,076	8,933
Office Overheads, Stationery, etc	Per Month	21,962	12	263,538	4,467
Contingencies	5% of the above			773,045	13,102
				16,233,941	***$ 275,152***
3. Capital Expenses					
Transport (2)				-	-
Computers & Office Equipment				-	-
Furniture & Fixtures				-	-
				-	$ -
GRAND TOTAL _ YEAR 5				***Rs. 170,696,491***	***$ 2,893,161***

Source: Extracted by the researcher from CFC literature collected from multiple domestic and international development agencies and CFC projects

Table 2.8: Combined 5 Year Project Costing

5 YEAR PROJECT SUMMARY

Assumptions
1. Annual Inflation of 10% has been assumed
2. 1 US$ = Pak. Rs. 59.00
3. Partial Staff hiring in Year_1. Full staff strength from Year_2 onwards
4. Annual CFC Set-up summary is as follows

	CFC Design	***Actual Set-up***
Year_1	10	5
Year_2	13	10
Year_3	12	13
Year_4	10	12
Year_5	5	10
	50	**50**

EXPENSE	*Year_1*	*Year_2*	*Year_3*	*Year_4*	*Year_5*	*Total*
CFC Setup	26,500,000	120,450,000	169,279,000	159,720,000	154,462,550	630,411,550
Recurring	8,410,500	12,196,800	13,416,480	14,758,128	16,233,941	65,015,849
Capital	4,500,000	1,000,000	-	-	-	5,500,000
	39,410,500	***133,646,800***	***182,695,480***	***174,478,128***	***170,696,491***	

GRAND PROJECT TOTAL	***Rs.***	***700,927,399***
	$	***11,880,125***

Source: Extracted by the researcher from CFC literature collected from multiple domestic and international development agencies and CFC projects

CHAPTER 3: THEORETICAL FRAMEWORK AND HYPOTHESES

3.1 INTRODUCTION

The primary purpose of this research is to investigate the effect of the use of the CFC program on SME competitiveness. The study also aims to investigate if the effect of CFC program usage on competitiveness changes due to the ACAP and NCAP of user SMEs. A theoretical model is proposed in Figure 1 at the end of this chapter that depicts the conceptualised relationships between variables. This study draws on RBT (Barney 1995; Penrose 1959; Wernerfelt 1984) and DCT (Eisenhardt &Martin 2000a; Teece, Pisano & Shuen 1997) to provide theoretical support for the conception of the proposed research framework. RBT explains that the 'why' and 'how' of technological knowledge and capabilities are critical for the manufacturing sector's SME competitiveness, and how the provision of such resources through external support programs may enhance SME competitiveness (Kim & Hemmert 2016). RBT provides a theoretical rationale as to why one should logically expect a direct effect of the CFC program on firm competitiveness. DCT, on the other hand, provides a rationale for arguing that the ability of the recipient SMEs to harness greater benefits and superior competitive performance from the CFC program may be contingent on the level of their ACAP and NCAP. DTC, therefore, provides strong reasons to expect that the ACAP and NCAP of SMEs may moderate the effect of CFC program usage on their competitiveness.

3.2 CFC USE AND SME COMPETITIVENESS

RBT asserts that firms with rare and valuable resources can achieve competitive advantage that can be sustained if they manage to make these resources inimitable and non-substitutable for competitors (Barney 1991; Dierickx & Cool 1989; Penrose 1959; Wernerfelt 1984). According to this description, the competitiveness or superior

performance of firms solely depends on their stock of critical resources and capability to make use of those resources (Dierickx & Cool 1989). Given this, RBT appears to provide justification for the positive effect of the CFC program on SME competitiveness. SMEs seldom possess premium stocks of resources and capabilities and, therefore, can struggle to develop and acquire truly valuable and rare pools of resources (Madrid- Guijarro, Garcia & Van Auken 2009). RBT stipulates that hard (technologies, equipment, capital etc.) and soft (technical knowledge and skills, information, capabilities etc.) resources provide initial input that SMEs can combine with their existing resource pools to develop a unique, inimitable and non-substitutable resource pool that consequently improves competitiveness. Thus, SMEs can acquire technological knowledge and resources from the CFC to generate a unique firm-specific resource pool that becomes difficult for competitors to catch up to (Barney 1991; Teece, Pisano & Shuen 1997). There is ample research available that provides the rationale and evidence about how access to external resources help SMEs build firm-specific resources and capabilities to gain competitive performance (Matlay, Bretherton & Chaston 2005; Mole & Keogh 2009; Rotger, Gørtz & Storey 2012; Yusuf 2014). For instance, Chrisman and McMullan (2000) used RBT to explain that business counselling services provided by the government positively influenced the knowledge and capabilities of recipient firms, which, in turn, helped them develop competitive advantage and secure better growth. Bennett and Robson (2003) by using RBT argued that firms can enhance competitive knowledge by taking competitive benefits from government support programs. Chrisman and McMullan (2004) used RBT to identify how external assistance serves as a knowledge source for new firms to ensure their survival and growth. Shamsuddoha, Ali and Nelson Oly (2009) used RBT to conceptualise and testify the impact of a government export assistance

program on different organisational and managerial related factors and organisational performance. Mole and Keogh (2009) also used RBT to conceptualise and test the impact of a government advisory service on a firm's strategic outcomes. Doh and Kim (2014), in their empirical study, found a positive relationship between technological development assistance provided by the Korean government and recipient SME innovation. Considering the above mentioned theoretical and empirical evidence, it is therefore hypothesised that:

Hypothesis 1- *The use of the CFC program will have a significant positive effect on firms';*

H-1a- Production Competitiveness

H-1b- Innovation Competitiveness

H-1c- Internationalisation Competitiveness

H-1d- Market Competitiveness

3.3. ROLE OF ABSORPTIVE CAPACITY (ACAP)

One important concern with respect to public support programs in general, and CFC programs specifically, is how SMEs can develop competitive advantage or achieve competitive performance when the same support is available to all firms in the industry. Further, scholars argue that in many cases external support programs fail to make the required impact on firm competitiveness (Alonso-Nuez & GalveGórriz 2012; Lages & Montgomery 2005). These concerns seem important to be addressed as they have been observed many times by researchers: despite having access to similar external technological resources, the performance of firms varies, even in the same industry (see Alvarez 2004; Barge-Gil & Modrego 2011; Nieto & Quevedo 2005). This is the issue critics believe RBT fails to address appropriately. Thus, other theories are

needed to develop better understanding of the external support–firm competitiveness relationship.

DCT explains how and what capabilities enable a firm to harness greater benefits and superior performance compared to these external resources (Teece 2007). ACAP is a critical dynamic capability that allows firms to acquire, assimilate, transform and exploit external knowledge and resources to create and sustain competitive advantage (Flatten, Greve & Brettel 2011; Zahra & George 2002). ACAP consists of a firm's accumulated stock of knowledge and capabilities, which re used to acquire and exploit new knowledge and resources to meet changing market needs (Cohen & Levinthal 1990; Liao, Welsch & Stoica 2013). Dussauge, Garrette and Mitchell (2000) explicitly assert that firms acquire and utilise external knowledge more efficiently in areas where they possess some prior knowledge and experience. Nelson and Wolff (1997), García-Morales, Ruiz-Moreno and Llorens-Montes (2007) and Liao, Welsch and Stoica (2013) argue that firms that operate in technological and innovation intensive environments need a higher level of ACAP to take greater advantage of market opportunities by designing innovative solutions and products.

With respect to the CFC program, SMEs are provided with access to technological knowledge and resources such as scientific equipment, production technologies, research and development facilities, and technical training to impart requisite technical knowledge and skills for competitiveness. The ability of SMEs to achieve competitive performance from this resource base largely depends on their ACAP to effectively learn, transfer, integrate, and exploit these technological resources. SMEs with higher levels of ACAP may leave competitors behind by quickly acquiring technological knowledge from the CFC, combining it with existing technologies and competencies to transform production and product development processes, then exploiting this

knowledge by developing and delivering innovative products to the markets. Firms with poor technological and innovation adoption history will have little knowledge and few skills to adopt and implement new technologies and therefore will not be able to take full advantage of belonging to the CFC program. ACAP in this process thus leads to competitiveness in two ways: first, in quickness in acquisition, assimilation, transformation, and exploitation of technological knowledge, and second, in the quality and innovativeness of products. In short, the literature clearly indicates that ACAP is a critical factor for achieving competitive advantage and superior performance through the use of externally available resource pools (Cepeda-Carrion, Cegarra-Navarro & Jimenez-Jimenez 2012; Zahra & Hayton 2008; Engelen, Schmidt & Buchsteiner 2015). Nieto and Quevedo (2005) build on Teece, Pisano and Shuen (1997) who argue about 'dynamic capabilities', to hypothesise and confirm that the effect of external technological opportunities on a firm's innovation is moderated by the ACAP of the firm.

Although little empirical research exists about the role of ACAP in the support program literature, considering the above theoretical and empirical arguments it is expected that:

Hypothesis 2 - The *ACAP of firms will moderate the effect of the use of CFC program on their:*

H-2a- Production competitiveness

H-2b- Innovation competitiveness

H-2c- Internationalisation competitiveness

H-2d- Market competitiveness

3.4 ROLE OF NETWORKING CAPABILITY (NCAP)

Scholars argue that competitiveness of SMEs, especially in contemporary cluster-based industrialisation, is also largely determined by their networks (Álvarez, Marin & Fonfría 2009; Kohtamäki et al. 2013; Parida et al. 2017). Literature asserts that the propensity of SMEs to develop, manage, and use external networks have substantial effects on several competitiveness outcomes such as innovation, operations, product development, market expansion, and financial performance (Gronum ,Verreynne & Kastelle 2012; Kastelle & Steen 2010; Vega-Jurado et al. 2008). NCAP in this regard is considered a distinct capability that determines the firm's ability to build and manage relationships with external entities and then use those links to build capabilities to exploit opportunities and gain competitiveness (Nishimura & Okamuro 2011; Ozkan-Canbolat & Beraha 2016; Vesalainen & Hakala 2014). NCAP seems very relevant to and critical for the ability of SMEs to take greater competitive benefits from CFC programs.

The competitiveness of Pakistani manufacturing SMEs is mainly dependent on advanced production technologies, product and process innovation, and expansion in domestic and international markets (Khalique et al. 2011). In order to achieve these outcomes firms need information about emerging markets, customers' needs, new technologies, and cheaper sources of production. They also require knowledge and competences to produce cost-effective and innovative products. Since this process involves diversified types of strategic and operational resources, SMEs have the tendency to form diverse knowledge-based networks to acquire required knowledge, information, and resources (Senik et al. 2011). For instance, most SMEs work as suppliers of domestic and international large-scale organisations that require them to deal with complex total supply chain arrangements. They receive product

specifications and quality standards from customers (B-2-B) and then collaborate with their own suppliers to get required quality raw material to produce products consistent with customer expectations. The quality of suppliers' inputs in this process is a prerequisite for the quality of the final product as per customers' requirements (Krause, Handfield & Tyler 2007). SMEs that compete directly in the market with their own products and brands also need strong collaboration with suppliers and distributors to design, develop, and sell new products efficiently. This process involves sharing of production processes and schedules, technological standards, and tacit knowledge such as technology roadmaps and shared norms (Inkpen & Tsang 2005). NCAP in this stream permits SMEs to access required technical and non-technical information and expertise from a diverse network, which enhances their operational and market competitiveness (Kim et al. 2014).

Networking is also critical for SMEs' innovation capabilities, which is another critical stream for SME competitiveness. Innovation always involves extra capabilities, resources, and investment, which makes SMEs unable to develop and market new products on their own. To cope with these challenges, SMEs join innovative networks and get into open innovation strategy (Vareska et al. 2009). Innovation networks provide SMEs access to innovative knowledge and resources embedded therein, which enable them to increase innovation performance (Florin, Lubatkin & Schulze 2003). Networking is also important for the exploitation of international opportunities (Voudouris et al. 2012). Through NCAP, firms identify viable international opportunities and adapt to the needs of international markets to exploit them. Firms with international networks, compared with their counterparts, quickly get information about changes and the resultant opportunities and threats in international markets. This allows them to proactively and efficiently develop strategies, technologies, and

production processes to produce relevant innovative products to seize emerging opportunities (Vahlne & Johanson 2013).

Several studies have investigated the enabling effects of NCAP on different firm-level competitiveness outcomes such as production (Biggs & Shah 2006), innovation (Zeng, Xie & Tam 2010; Parida et al. 2017), technological learning (Chipika & Wilson 2006), research and development effectiveness (Thorgren, Wincent & Örtqvist 2009), new product development (Soh 2003), internationalisation (Chetty & Holm 2000), performance improvement (Krause, Handfield & Tyler 2007), and overall competitiveness (Álvarez, Marin & Fonfría 2009). For instance, Ritter and Gemünden (2004) argued and empirically identified that firms must contain both technological and networking competences to achieve competitive performance. Hafeez, Shariff and Lazim (2013) identified a positive relationship between learning from relational networks, technological innovation, and of SMEs in Pakistan. Boschma and Ter Wal (2007), in their case study, challenged the conventional claim that geographical proximity evenly facilitates performance, and found the varying impact of knowledge networks on firms' innovation performance depends on the strength of the network. Building on this finding, it can be inferred that NCAP of SMEs participating in the CFC program may increase their ability to achieve competitive performance through the technological resources acquired from the CFC. Therefore, it is hypothesised that:

Hypothesis 3 – *Networking capability of firms will moderate the effect of the use of the CFC program on their:*

H-3a- Production competitiveness

H-3b- Innovation competitiveness

H-3c- Internationalisation competitiveness

H-3d- Market competitiveness

The following framework (Figure 3.1) indicates the proposed causality between variables along with hypothesised directions.

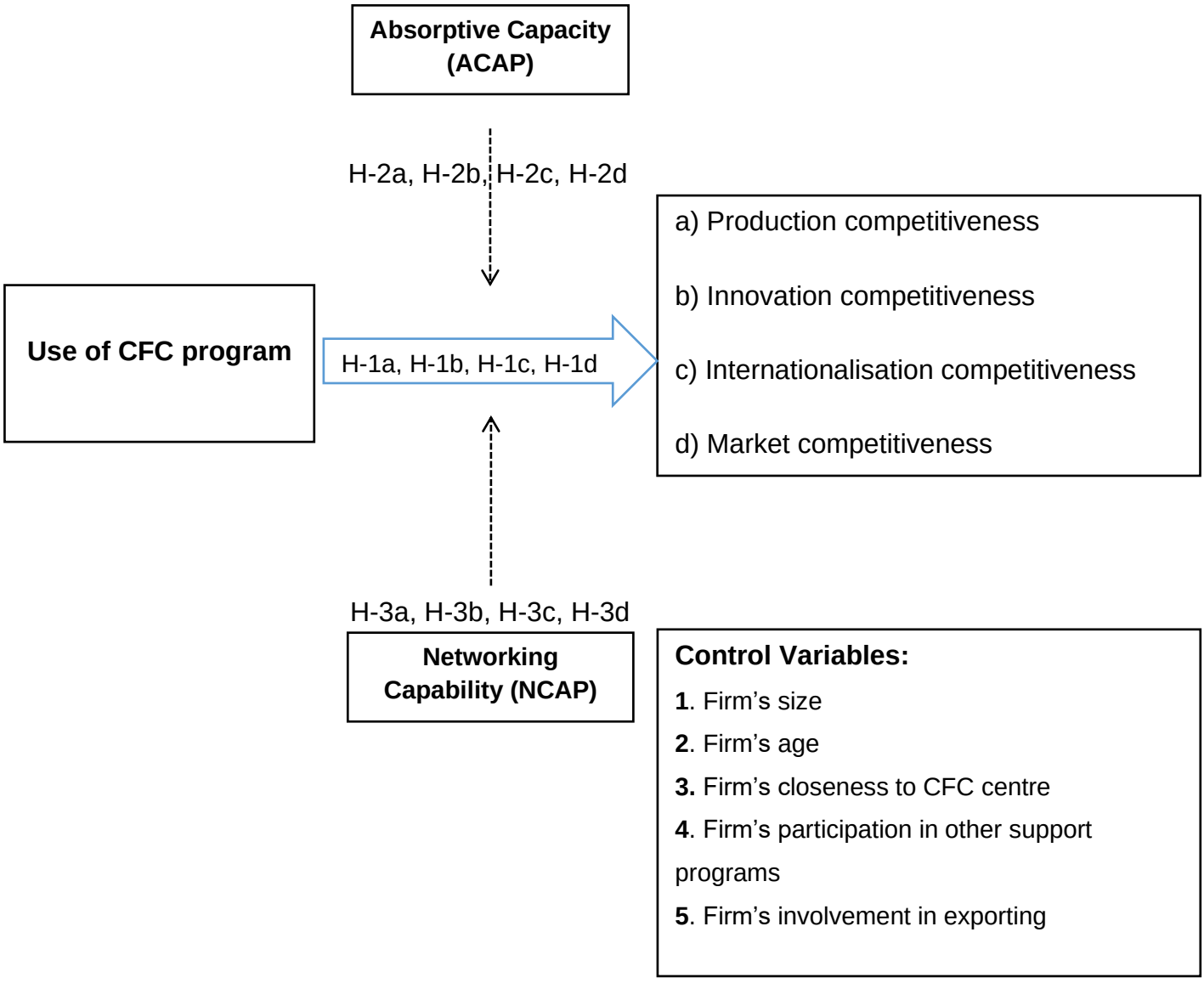


Figure 3.1: Conceptual Framework

CHAPTER 4: METHODOLOGY

4.1 INTRODUCTION

This chapter provides information about the philosophical stance, research strategy, and data collection process employed by the research to answer the research questions and meet the study's objective. It will also provide information about the population and sampling frames along with instrument development. The data analysis technique employed and the interpretation of results are also explained.

4.2 RESEARCH PARADIGM/PHILOSOPHY

The main objective of this research is to empirically evaluate the effectiveness of the CFC program; this study draws its philosophical assumptions from the positivist research paradigm (Hughes & Sharrock 1997; Schrag 1992). First, this study intends to demonstrate a logical link between CFC program usage and SME competitiveness from already established theories. Second, this study intends to measure the effectiveness of the CFC program with respect to pre-determined criteria derived from prevailing theories of firm competitiveness and dynamic capabilities. A positivist stance allows this study to investigate and explain effectiveness status of the CFC program by using objective and numerical data from beneficiary SMEs without any influence of researcher on their feedback (Travers 2001). The positivist paradigm is relevant as this study intends to investigate the effects of the CFC program on user competitive outcomes; it does not intend to investigate the mechanism or social process through which this program influences firm competitiveness. It is also pertinent to understand that performance is always evaluated against some pre-determined and objective benchmark or standard. The use of the positivist paradigm specifically for evaluation-related studies in Pakistan has been recommended by

Kitchlew (2017), who recently completed her performance evaluation study in Pakistan.

4.3 RESEARCH STRATEGY

In quantitative research, researchers primarily follow positivist assumptions of cause-effect relationships and tend to use deductive reasoning, development of questions and hypotheses, and use of objective measures and observations to produce numerical data to address the research problem and answer research questions (Creswell 2013). For this study, a quantitative research strategy is the most suitable because it will facilitates the collection of objective data using a reliable instrument from a large number of SMEs that have used facilities and services rendered by the CFC program, in different sectors and industries all over Pakistan.

4.4 RESEARCH DESIGN AND METHOD

Researchers holding a positivist perspective and using a quantitative research strategy collect objective/numerical data using surveys or the experimental method (Bryman & Cramer 2009). Empirical studies investigating the effect/impact of support programs on firm performance have widely used surveys to measure the effectiveness of such programs (see Antonio Belso-Martínez 2006; Bae 2015; Baptista & Swann 1998; Branstetter & Sakakibara 2002; Freixanet 2012; Gencturk & Kotabe 2001; Grilli & Milano 2009; Ito & Lechevalier 2010; Kang & Park 2012; Katsikeas, Leonidou & Morgan 2000; Marandu 1995; Molina-Morales & Expósito-Langa 2012; Nishimura & Okamuro 2011; Shamsuddoha, Ali & Nelson Oly 2009; Wilkinson & Brouthers 2000). The survey method allows researchers to independently test and verify the conceptualised relationship between different variables without influencing the measurement of variables and respondents. This permits the researcher to compare, explain and generalise trends, behaviours, and attitudes among the larger population

that can be used to further support theories (Creswell 2009). A review of the extant literature on empirical investigations of support programs reveals that majority of research conducted with positivist assumptions and quantitative research strategy adopted a cross-sectional survey methodology to collect data and test hypotheses (see Blumentritt & Danis 2006; Durmuşoğlu et al. 2012; Hult, Hurley & Knight 2004; Hussey & Eagan 2007; Salavou, Baltas & Lioukas 2004; Scozzi, Garavelli & Crowston 2005). Considering the intention of this research to determine how much contribution the CFC program has made to beneficiary firm competitiveness, a cross-sectional survey methodology seemed the most appropriate option for a number of reasons. First, it allows researchers to reach out to a large and geographically dispersed (country-wide) sample size of SMEs in Pakistan, which with any other method would be very difficult. Second, in Pakistan, it is difficult to access employees (especially non-owners) of SMEs to talk privately about their firm's performance or how they undertake activities. The primary respondent in this study is the SME owner; however, response is also required from a production manager or person who deals with CFC-related facilities. Therefore, the self-administered questionnaire is considered an appropriate tool to seek permission from SME owners to seek information from the non-owner employee. Finally, time and cost considerations also support the cross-sectional survey method as the best option for this study.

4.5 RESEARCH POPULATION AND SAMPLING

The nature and aim of the study, cost, accessibility, and availability of information are a few key factors that have an influence on a study's population and sampling decisions (Blaikie 2000; Bryman & Cramer 2009). This study aims to evaluate the effectiveness at the firm (SME) level, therefore SMEs that have used or have been using CFC's facilities and services are taken as the population of this study. During

initial work with relevant SME development agencies and information obtained through reliable sources, it was expected that around 50 CFCs would be operating in different industrial clusters all over Pakistan. There was no one, authentic source available where the exact number and current status of CFCs could be obtained. Even the government's federal agency working for SME development did not have information about CFC projects that had been established by different provinces through local or foreign funding.

During data collection, it was found that out of the list of 50, 5 were incubators and not CFCs. Incubators were outside the scope of the study and were excluded from the list. From the remaining 45 CFCs, five were non-industrial CFCs working for agriculturists or the cottage sector. Since this study focused only on CFCs working for pure industrial and manufacturing sector SMEs, non-industrial and non-manufacturing CFCs were removed from the list. From the remaining 40, 18 CFCs were either closed due to completion of the project and poor performance or were still under construction due to lack of finances. The final available list for data collection consists of 22 technology-based, industrial sector CFCs. The majority of CFCs (80%) are working in Punjab province, which is the most populated province holding the most industrial clusters. The other 20% of CFCs are working in other two provinces: Sindh (two CFCs) and Khyber Pakhtunkhwa (two CFCs). An additional three CFC projects were identified in Balochistan province; however, on inspection, they were found to be under construction due to delay in the allocation of sufficient budget by the government.

The selected CFCs were contacted to obtain the list of SMEs they had been using in their facilities. The scope and objective of the project were explained to them and then a request was made to provide access to the contact details of their client SMEs. Two CFCs did not cooperate despite several requests and reminders over three months

and thus the access to detail of client SMEs was obtained from 20 CFCs. A total of 845 SMEs were benefiting or had benefited from different facilities of their respective CFCs during the past three years. In sum, the population of this study comprised of 845 SMEs that had been taking facilities from CFCs during the past three years. The list of CFCs and number of client SMEs can be seen in Table 4.1.

Table 4.1: List of CFCs

	CFC Name	No. of Client SMEs	Province	Sector/Industry
1	Business Support Centre Sargodha	18	Punjab	Multiple
2	Product Development Centre, Sialkot	22	Punjab	
3	Ceramics Development Centre, Lahore	60	Punjab	Ceramics
4	Gujranwala Tools, Dies and Moulds Centre	66	Punjab	Multiple
5	Karachi Tools, Dies and Moulds Centre	28	Sindh	Multiple
6	Light Engineering Service Centre, Gujranwala	67	Punjab	Multiple
7	Ceramics Development and Training Complex, Gujranwala	76	Punjab	Ceramics
8	Metal Industries Development Centre Sialkot	45	Punjab	Multiple
9	Auto Parts Centre, Lahore	47	Punjab	Auto Parts Sector
10	CTFC for Agricultural Implements Mardan	27	KPK	Agriculture Implements
11	Fan Development Institute, Gujrat	31	Punjab	Fan Sector
12	Leather Product Development Institute	64	Punjab	Leader Sector
13	Foundry Service Centre Lahore	25	Punjab	Foundry Sector
14	Sports Industries Development Centre Sialkot	53	Punjab	Sports Sector
15	Technical Service Centre, Lahore	36	Punjab	Metal Industries
16	Pakistan Industrial Technical Assistance Centre	54	Punjab	Multiple
17	CTFC for Light Engineering Cluster, Mardan	22	KPK	Multiple
18	National Institute of Design and Analysis (NIDA), Lahore	50	Punjab	Multiple
19	National Institute of Design and Analysis (NIDA), Sialkot	22	Punjab	Multiple
20	National Institute of Design and Analysis (NIDA), Karachi	32	Sindh	Multiple

Source: Researcher complied this list from multiple government offices such as SMEDA, and government departments' website.

4.6 DATA COLLECTION PROCEDURE

Data were collected according to a rigorous, multi-step process to avoid common method bias that could potentially harm the validity and reliability of the findings. Data in this study was collected directly from SME owners and managers using a self-administered questionnaire over a period of four months. The list of 845 SMEs was obtained from 20 CFC centres.

In the start of data collection process, an initial appointment was made with CFC management to explain the research objective and obtain permission. A Participant Information Sheet was shared with them in which all the information about the research and the data collection process was given. At the end of the sheet, permission was requested to access the list of their client SMEs along with their usage details during the past three years. The use of CFC program was independent variable in this research and thus availability of secondary data about the usage could be add to validity and reliability of findings. For instance, the objective data was useful to know the exact level of usage of all CFC facilities. This was also important to avoid common method bias.

20 (out of 22) CFCs readily provided the detail of their client SMEs. However, only eight CFCs provided an Excel sheet of the information about SMEs' past three years' usage of CFC facilities. Twelve CFCs denied access to usage data by claiming it was sensitive data. Technically it was a public document, and anyone could access usage detail; however, these CFCs used their discretionary power to deny access. In response to the resultant data limitations, the choice was made to use available objective usage data of eight CFCs to compare with their subjective responses to note whether any significant difference exists between the two.

From the obtained list of 845 SMEs, initial contact was made with them via telephone to seek permission to visit their office or send them a questionnaire to complete at their convenience. Over four months, 695 user SMEs could be contacted. The other 150 SMEs could not be contacted either due to lack of valid contact details or lack of response to calls and letter. An attempt was made to obtain valid contact details of these SMEs from their respective CFC centres. However, CFC management was unable to provide any feasible alternatives for these 150 SMEs. From the analysis of the data provided by CFC management about the usage of CFC facilities, it was revealed that those 150 SMEs had used CFC facilities only one or two times during the past three years. It is assumed that either they had closed their operations or moved into any other industry or market. However, this demonstrated the limited capacity of CFC management to maintain database of users and firm's use of their services.

During the initial contact with 695 user SMEs, around 40% of SMEs requested the researcher visit them personally to explain and complete the questionnaire onsite. Around 12% requested the researcher send the questionnaire through courier service or by email. Around 36% of SMEs chose not to participate in the survey directly but requested the researcher involved their CFC's administration to make a formal request. Another 12% chose not to participate in the survey. The 36% of SMEs who initially opted out without the endorsement of their CFC administration wanted to ensure that the survey was legitimate and had the support of the CFC. Since this represented a significant proportion of the sampling frame and could potentially lower the response rate, this led to a change in the data collection strategy. Before starting this survey, initially, it was decided that CFC Management would not be engaged in data collection to avoid any possible influence on the results of the data. However,

due to low response rate, it was decided to use CFC staff just to introduce the researcher to SMEs to ensure that there was no influence of CFC Management on respondent feedback. Therefore, a request was made to CFCs and, as a result, CFCs agreed to send their Marketing and Business Development personnel along with the researcher.

An overview of the research objectives and processes for participation in the survey was given over the phone, and a Participant Information Sheet accompanied by the questionnaire sent to 615 participants. Data were collected in a sequence from different provinces since CFCs and client SMEs were geographically dispersed all over Pakistan. The majority of CFCs were operating in Punjab province and data collection started there. Within Punjab, there was geographical dispersion, so the Punjab province was divided into four regions. During the initial two and a half months, the questionnaires were distributed and collected in all four regions. During the next one and half months, the data was collected from Sindh and Khyber Pakhtunkhwa provinces. There were two CFCs operating in each province. The same data collection strategy was adopted for the distribution and collection of questionnaires. In short, after many reminders through phone calls, emails, and text messages over the period of four months, the total number of collected questionnaires reached 236 and the final response rate was 38%.

Non-response bias was considered using the extrapolation method by comparing size, age, and usage rate of early and late respondents (Armstrong & Overton 1977). The extrapolation method assumes that late respondents are similar to non-respondents and in case of absence of demographics of actual non-respondents, late respondents can be compared with early respondents. This method has been frequently used by a large number of management researchers (Chen, HL & Hsu 2013; Knight & Cavusgil

2004; Su, Xie & Wang 2015). There was no significant difference found in age, size and usage rate between the early and late responding SMEs. In each firm, two questionnaires were distributed. One questionnaire was to be completed by the head of the organisation (i.e., CEO, owner, director etc. as Pakistani SMEs use different titles) whereas the second questionnaire was completed by the head of the production or the person who was responsible for CFC-related activities. Since the questions asked in the survey were about firm-level activities, the CEO/owner was considered the most appropriate person to contact for this information. A large number of past studies have found CEOs or head of organisations are the most relevant and knowledgeable persons in SMEs to speak about firm-level strategies, operations, and situations due to their holistic orientation and key role in strategic decision making (Heavey & Simsek 2013; Lumpkin & Dess 1996; Wales et al. 2013; Wiklund & Shepherd 2003b; Zahra & Covin 1995).

Consistent with RMIT University's ethical guidelines, it was explicitly explained in the letter that the participation in the survey was voluntary and that participants could decide to withdraw from the survey at any stage without any penalty or negative social implications. It was also ensured that the information given in the survey would be used for academic purposes only and with confidentiality. The objective of collecting a second response from personnel responsible for production or CFC activities was to minimise common method bias. The second response from production personnel could more authentically communicate the production performance status. However, only 132 firms returned two questionnaires. Most SMEs only provided one response as the head of the organisation was also dealing with CFC-related matters. Other SMEs indicated: the person was not available, there was no need for a second response, "what I am saying is final", "that person is illiterate", and/or "we do not have

time". Since the target of using accumulative scores of two responses could not be achieved, it was decided to use the second response for comparison in analysis to determine whether there existed any significant difference among the two responses, and between SMEs who produced one or two responses.

Due to language issues, it was considered necessary to translate the questionnaire into Pakistan's national language, Urdu. The following section describes the process of instrument development and translation.

4.7 THE QUESTIONNAIRE

The design of questionnaires is important to obtain valid and reliable information and it critical that items included in the survey instrument are relevant, clearly written, and understandable to respondents. Rea and Parker (2014) have suggested a rigorous multi-step procedure to designing a questionnaire, which includes: 1) clear identification of the problem (understanding of research context), 2) developing the draft questionnaire, 3) critical evaluation, 4) pilot testing and result evaluation, and 5) revision or modification for final questionnaire administration. Contemporary scholars have widely endorsed and adopted this rigorous process to produce credible and authentic data and resultant knowledge (see Liu et al. 2013; Tzokas et al. 2015). The literature further suggests adopting or adapting measurement items from existing and well-validated scales (Pavlou & El Sawy 2006). However, in the case of developing significantly changed or new items, the procedure proposed by Churchill Jr (1979) is recommended. In this procedure, the domain of each measurement construct is defined, items are selected from a conceptually relevant large pool, and items are refined through expert reviews and pre-testing.

Following the guidelines and procedure suggested by the literature, in the first step, the context of the research and data needs were clearly defined. This research aimed to investigate the effect of CFC program usage on the competitiveness (production, innovation, internationalisation, market) of user SMEs, with a possible moderating effect of ACAP and NCAP of SMEs. Empirical data was required that could be numerically analysed and presented. The structured, self-administered questionnaire was adopted for the collection of data. Responses were subjective and self-reported. Although there are concerns among scholars regarding the influence of selection bias or social desirability in subjective and self-reported responses, there is sufficient evidence that support their general reliability (Dess & Robinson 1984; Madrid-Guijarro, Garcia & Van Auken 2009).

Apart from CFC program usage, all other constructs (i.e., competitiveness (four dimensions), ACAP, and NCAP) in this study's conceptual framework were latent and thus could be measured indirectly using different items. There were multiple measurement scales available for all these variables, so the final scale in this study was developed by reviewing all well validated scales. The decision to select items for each construct was made based on the objective of the current research, relevance with SMEs in Pakistan, nature of the CFC program, understanding of respondents, and length of the questionnaire. For instance, the CFC program was initiated to improve the competitiveness of manufacturing sector user SMEs across multiple dimensions such as production, innovation, internationalisation and financial. So, the construct of competitiveness and related items were selected to address this multidimensionality. Most constructs were developed and tested in Western contexts, so measurement items that related closely to this study's context were chosen. Some scales had used a substantial number of items to measure the construct whereas

some adopted relatively shorter versions. The length of the structured questionnaire has a significant impact on the willingness of participants to participate and provide accurate responses in the survey (Galesic & Bosnjak 2009). Burchell and Marsh (1992) found extra study length was a significant disincentive for survey response. Therefore, the selection of measurement scales was also made by taking into consideration the potential effect of the length of the questionnaire on participation and response of SMEs. All the selected items were taken from studies that had previously yielded higher reliability and validity.

After selecting the most appropriate measurement items for constructs, the next step was to operationalise constructs by selecting an appropriate rating scale for measurement. In survey research using a structured instrument, operationalisation usually involves semantic differential or Likert-type formats in a series of scale items with a familiar format (Hair et al. 2006). Review of the empirical literature revealed that most scholars studying the impact of support programs use Likert-type formats. The Likert-type format is also one of the most widely adopted approaches in the social sciences field due to advantages such as ease of development, understanding and responding (Lozano, García-Cueto & Muñiz 2008). A fewer number of rating categories reduces the correlation coefficient whereas an extra-long range creates confusion among respondents and may cause the issue of normal distribution. A moderate rating range provides reliable data for the normal distribution of data and statistical analysis (Givon & Shapira 1984). Most of the studies investigating similar constructs have used a 7-point rating scale, which is considered moderate. Therefore, a Likert type rating scale ranging from 1 to 7 was adopted in this study.

In the next step, expert feedback on the draft questionnaire (see Appendix 1) was obtained from two qualified academics (PhDs), two experts from development

agencies working for SME development, and two SME owners. Although the academic experts were primarily associated with private sector universities, they provided training and consultancy services to manufacturing sector SMEs. They were also involved with federal and provincial SME development agencies and thus were fully aware of the scope of the CFC program and SME competitiveness. Two experts from SME development agencies were selected on the basis of their research orientation and having more than ten years of professional experience in SMEs development. These experts were undertaking part-time research degrees and research-related work (publishing research and presenting at conferences) was part of their job at the workplace. Two selected SME owners were involved with development agencies, chamber of commerce, industry association, and universities and had good interest in reading and research.

The initial draft of the questionnaire (see Appendix 1) was shared with these experts with details of the research's objectives, questions, constructs, and data collection strategy. It was also communicated to them that the final questionnaire would be translated into Urdu. The main reason for involving experts was that the adopted scales and items were developed and tested in developed countries. To ensure that the language, meaning, and rating scales were appropriate with respect to the objective of this research and the ability of the respondents, an expert review of an initial draft of the questionnaire was necessary. Experts suggested modification to the wording of some statements to make them clear and more understandable. They further advised to reduce the length of the questionnaire and keep it as short as possible. They were unanimously of the view that SMEs in Pakistan would decide on participation after looking at the length of the questionnaire. Experts also unanimously advised the removal of questions that were related to any objective information about

firm matters, performance and/or financial matters. They were of the view that SMEs, due to their tax aversion, hide details of employees and finances. Experts also suggested deleting a few overlapping statements and including a few new ones that they considered important for the research.

One major change that took place during this expert review process was a change in the ACAP scale. The proposed scale consisted of nine items to measure ACAP of the firm. However, the expert panel found the scale's statements somehow complicated and difficult to understand, especially keeping in mind the translation into Urdu. The researcher then shared with them another scale, of 12 items, and experts found that more appropriate in terms of ease of understanding and relevance with SME context. Therefore, the 9-item scale was replaced with the 12-item scale. Detail of the selected scale is provided in Appendix 1. After collating all suggested changes, the revised questionnaire was developed and sent again to those experts for another review. With minor amendments, they approved the questionnaire for language translation. The finalised version of the questionnaire is provided in Appendix 2.

The final questionnaire was translated into Urdu, following the back-translation method as proposed by Brislin (1980). Back translation is considered the most appropriate method to translate research instruments into other language and the majority of researchers have adopted this approach in their studies (Cha, Kim & Erlen 2007; Law, Wong & Song 2004; Maneesriwongul & Dixon 2004). Following this method, the first draft of the questionnaire along with the Participant Information Sheet was developed in English. After that, an expert bilingual translator was hired to translate the instrument into Urdu. The translated version was shared with the same five experts to check the quality of the translation, meanings of statements and rating scales, and overall suitability of the instrument for data collection. Experts were very good in both English

and Urdu languages and thus were fully qualified to review and comment on the translated version. Experts pointed out several issues and also provided constructive feedback to fix them. After three rounds of iterations, they finally approved the translated version by declaring it almost like the English version in its essence. A separate professional bilingual translator was then hired to convert the Urdu language instrument into the English language. Back translated and original English versions of instruments were shared again with three experts who found it appropriate matching the original English version with high accuracy. The final Urdu version of the questionnaire provided in Appendix 3.

4.8 PILOT TESTING

Pilot testing was undertaken in one cluster of Punjab province where one CFC has been operating since 2009. Pilot testing helps to identify and remove any issues that may exist in a questionnaire design and ensure the reliability and validity of measures (Zikmund et al. 2013). The Urdu version of the questionnaire was sent to 80 CFC user firms who had been using facilities and services of that CFC over the past 5 years. Hair et al. (2010) recommends that when an instrument includes items being taken from previous studies then it should be pilot tested on the sample representative of study's actual population. Since the population of this study was SMEs that were using CFC facilities, the sample for pilot testing was also taken from the same population. Over the following two weeks, 22 responses were received. Open feedback about their satisfaction with the length, clarity, time and ease to complete the questionnaire was sought. Reliability scores of all measures ranged from 0.867 to 0.961, which yielded high reliability of the scale for final data collection (Nunnally 1978). The test respondents showed 85% satisfaction with length, clarity, time and ease. Some confusion in the list of CFC facilities and services, networking, and production

competitiveness were reported by the test respondents, which was addressed in the finalised instrument. Test respondents were not included in the list of SMEs to whom the final instrument was sent.

4.9 MEASUREMENT VARIABLES

The finalised Urdu version of the questionnaire included mainly two sections. In the first section, information about the company background was sought. There were 25 questions in this part related to the firm's age, size, ownership setting, owner's age, qualification and experience, resources strength, distance from CFC, usage of other support programs, and exporting status. In the second section, information about the main variables of research, such as firm's use of CFC program, innovation, production, internationalisation and market performance, ACAP, and NCAP, was obtained using 64 questions. In this section, respondents were asked to rate statements by using the seven-point Likert-type scale. All information in this section was based on perceptual responses from the owners/managers of SMEs. Perceptual measures are appropriate when 1) the respondents are unwilling or unable to provide objective information, 2) when it is difficult for the researcher to obtain objective measures, and/or 3) when aiming for objective data can lower the response rate (Brouthers, Brouthers & Werner 1999; Peng & Luo 2000; Woodcock, Beamish & Makino 1994). There are several scholars who have identified 1) the strong positive correlation between objective and subjective measures (Dess & Robinson 1984; Frishammar & Åke Hörte 2005; Geringer & Hebert 1991; Ketokivi & Schroeder 2004; Madrid-Guijarro, Garcia & Van Auken 2009; Zahra & Covin 1993), 2) slight differences in results of perceptual and objective measures (Rauch et al. 2009), and 3) perceptual measures as superior to objective ones (Hughes 2001). Given this, it was appropriate for this study to use self-reported measures to investigate the CFC program's competitiveness effect.

Other than CFC program usage, all items in the questionnaire were rated on a seven-point Likert type scale where 1=Strongly Disagree and 7=Strongly Agree. An aggregated higher score of each variable indicated the greater prevalence of the respective phenomenon in the responding firm.

The following provides detail about dependent, moderating and independent variables.

4.9.1 SME Competitiveness

SME competitiveness is the dependent variable in this research's conceptual framework. As has been argued earlier, the competitiveness of a firm is a relative, multidimensional, and complex phenomenon (Ajitabh & Momaya 2003; Bhawsar & Chattopadhyay 2015a). Most previous studies used financial indicators, single measures, or homogenous indicators to measure firm competitiveness. However, the literature indicates it should be measured with respect to its unique scope, context, complexity, multidimensionality and by applying a multifaceted framework and multiple variables (Ajitabh & Momaya 2003; Chaudhuri & Ray 1997; Depperu & Cerrato 2005; Flanagan et al. 2007; Liučvaitienė et al. 2013; Vlachvei & Notta 2016). Measurement of manufacturing sector SME competitiveness is particularly challenging because these firms have to outperform competitors simultaneously in areas of production, technology adoption, innovation, market expansion, and financial output. In the case of CFC, the program intends to affect all these outcomes, and therefore it is an important decision to select all these relevant dimensions for its effectiveness measurement (Storey 2008). The currently available frameworks do not sufficiently address the need for the specific measurement of manufacturing SME competitiveness (Bhawsar & Chattopadhyay 2015b; Cetindamar & Kilitcioglu 2013).

Consideration of multiple outcomes or indicators that will best match the context and objective of competitiveness evaluation is thus required (Coates & McDermott 2002). Studies conducted by Gencturk and Kotabe (2001) and Szczygielski et al. (2017) concluded that the evaluation of the effectiveness of government assistance programs is largely influenced by the performance dimensions that researchers use for evaluation. Freixanet (2012) contends that one of the reasons for the inconsistent findings of support program impact may be due to selection of measurement criteria.

This study measured SME competitiveness by using four dimensions: 1) production competitiveness, 2) innovation competitiveness, 3) internationalisation competitiveness, and 4) market competitiveness. Literature indicates that these dimensions are not mutually exclusive and there is evidence where firms excelled in one but collapsed in another (Bessant & Francis 1999). Competitive advantage theory also validates this interpretation as firms mostly develop their unique advantage over competitors in one specific area by maintaining parity in other areas (Barney 1995; Cetindamar & Kilitcioglu 2013).

- ***Production competitiveness:*** Production competitiveness was measured using15 items adapted from Schroeder, Bates and Junttila (2002), Vickery, Droge and Markland (1993), Morris and Stevens (2010), and Ferdows and De Meyer (1990). Items were selected in light of the CFC program's objectives, Pakistan's SME production challenges, and review of the influential literature on firms' production-based competitive advantage (Hayes & Wheelwright 1984; Kumar & Motwani 1995). The rating was made in comparison to close competitors during the past three years. Respondents were asked to show their agreement or disagreement by using a one to seven scale with the statements related to their firm's production performance compared to close competitors

during the past three years. A higher score indicated greater agreement with their firm's production competitiveness.

- ***Innovation Competitiveness:*** Innovation competitiveness was measured using four items that were adapted from Madrid-Guijarro, Garcia and Van Auken (2009) and O'Cass and Weerawardena (2009). Three items measured the introduction of totally new or significantly improved products, processes, and production technologies, whereas one item measured the overall innovation reputation of the firm. The rating was made in comparison to close competitors during the past three years. Respondents were asked to show their agreement or disagreement by using a one to seven rating scale with the statements related to their firm's innovation performance compared to close competitors during the past three years. A higher score indicated greater agreement with their firm's innovation competitiveness.
- ***Internationalisation Competitiveness:*** This study measured internationalisation competitiveness by using seven items taken from Yiu, Lau and Bruton (2007), Zahra, Neubaum and Huse (2000), Freixanet (2012) and He, Brouthers and Filatotchev (2013). The rating was made in comparison to close competitors during the past three years. Respondents were asked to show their agreement or disagreement by using a one to seven rating scale with the statements related to their firm's export performance compared to close competitors during the past three years. A higher score indicated greater agreement with their firm's internationalisation competitiveness.
- ***Market-based Competitiveness:*** The firm's market performance was measured against sales, market share, profitability, return on investment, productivity, and overall competitive compassion through six items taken from Sheng, Zhou and

Li (2011) and Tracey, Vonderembse and Lim (1999). The rating was made in comparison to close competitors during the past three years. Respondents were asked to show their agreement or disagreement by using a one to seven rating scale with the statements related to their firm's market performance in comparison to close competitors during the past three years. A higher score indicated greater agreement with their firm's market competitiveness.

4.9.2 Absorptive Capacity (ACAP)

A firm's ACAP was measured by adapting 12 items from (Liu et al. 2013) and (Pavlou & El Sawy 2006). These items measure a firm's ability to acquire, assimilate, transform and exploit external knowledge. In the literature, there is variation in ACAP dimensions. For instance, Zahra and George (2002) conceptualised ACAP into two dimensions, namely potential ACAP and realised ACAP. Jansen, Van Den Bosch and Volberda (2005) applied a confirmatory factor analysis technique to identify a four-factor (dimensions) model as the best compared with two-factor and three-factor models. They, therefore, segregated absorptive ACAP into four dimensions including acquisition, assimilation, transformation, and exploitation. Pavlou and El Sawy (2006) adopted a 10-item scale of ACAP without explicitly differentiating it into sub-dimensions. Based on this variation and rationale provided by previous authors, it was decided to include a 12-item scale without identifying specific dimensions in anticipation of the exploration of the underlying structure through exploratory and confirmatory factor analysis at the analysis stage. This method is consistent with Jansen, Van Den Bosch andVolberda (2005).

The rating was made in an absolute sense and without comparison to close competitors. Respondents were asked to show their agreement or disagreement by

using a one to seven rating scale with the statements related to their firm's ACAP. A higher score indicated greater agreement with their firm's ACAP.

4.9.3 Networking Capability (NCAP)

A firm's networking capability was measured using 13-items adapted from Sheng, Zhou and Li's (2011) seven items, Lee, Lee and Pennings's (2001) two items, and Yiu, Lau and Bruton's (2007) two items, and two additional items that were related to close relationships with CFC management and chambers/industry associations. SME networking with CFCs and industry associations and chambers is crucial for their competitive performance in Pakistan (Seth et al. 2013; Shahzad 2015). The rating was made in an absolute sense and without comparison to close competitors. Respondents were asked to show their agreement or disagreement by using a one to seven rating scale with the statements related to their firm's working relationships with the given constituencies. The operational definition of 'working relationship' was given in the questionnaire (a sufficient, friendly and co-operative relationship that allows your firm to perform its functions and activities efficiently and effectively). Higher scores indicated greater agreement with their firm's networking capability.

4.9.4 CFC Program Usage

The use of the CFC program was measured against nine distinct facilities and services that most CFCs were offering to SMEs. The list of facilities and services is available publicly and on multiple media platforms such as SMEDA, ADB, and CFC websites and documents. Respondents were asked to indicate the extent of which their firm had been using each facility during the past three years on a seven-point rating scale where one represented 'little extent' and seven represented 'large extent'. In cases where an SME had never used any service, there was an option to select zero. A

higher score indicated greater use of the CFC program. An aggregated score of all services was used to calculate CFC program usage. In the original questionnaire there were nine services; however, two of them were not being offered consistently across all CFCs so they were removed from the final data set.

It was expected that the use of a greater variety of CFC programs would contribute more to user firms' competitiveness. The notion of using a greater variety of support services is evident in the support program literature (Shamsuddoha, Ali & Nelson Oly 2009) and it is argued that no single service can individually contribute to organisational competitiveness, especially in international markets. Therefore, competitiveness can be better achieved by using a greater variety of support services and it is logical to expect that the effect of support programs on the desired organisational outcomes may be a result of synergetic impact of different support services. Aggregation is also effective in avoiding the problem of establishing the weight of each service of a program (e.g., those services that are used frequently or only once) or different quality among services and centres that provide them. It is also assumed that firms that use CFC program are at a certain level of involvement and know the importance and need of the services before they decided to use it, instead of knowing its utility after the use. This approach and the given arguments are consistent with empirical studies conducted on the support program effects (see Francis & Collins-Dodd 2004; Shamsuddoha, Ali & Nelson Oly 2009).

4.10 CONTROL VARIABLES

This study considered firm age (total number of years since inception), firm size (total employment), firm's span of operations (domestic vs. international), firm's distance from CFC (close, medium, far), and firm's participation in multiple support programs as control variables. Previous studies on the effectiveness of support program have

widely used most of these factors as control variables (Alvarez 2004; Haddoud, Jones & Newbery 2017; Li & Geng 2012; Voudouris et al. 2012). Firm's age and size appear to influence dynamic capabilities and competitiveness dimensions such as production, innovation, internationalisation and market-based performance of SMEs mainly due to length of experience, expanded networking, and resultant accumulated knowledge base (Arend 2014; Coad, Segarra & Teruel 2016; Hansen 1992; Huergo & Jaumandreu 2004a, 2004b; Nieto & Santamaría 2010).

Innovation is considered a common feature among both small- and large-scale organisations; however, small firms are considered naturally advantaged in terms of their higher potential to produce more innovative products and services as compared to large-scale firms (Doh & Kim 2014). Large size and age of the organisation also increase knowledge repository and wisdom of organisations, which may result in improved management practices and processes to obtain superior performance outcomes (Huergo & Jaumandreu 2004b; Parida, Westerberg & Frishammar 2012). Size of the firm is measured according to the number of employees and is coded micro (if less than 50 employees), small (if between 51 to 150 employees), medium (if between 151 to 300 employees), and relatively large (if between 251 to 350 employees). Age of the firm is measured according to the number of years the firm has been in operation since its inception (Fu et al. 2015). Age of the firm is coded as a categorical variable with groups ranging from less than 1 year through to more than 12 years old.

Firms' prior involvement in export activities or export orientation also seems to have an influence on the user SMEs' ability to achieve higher internationalisation competitiveness as compared to firms that have no or little export experience (Filatotchev et al. 2009; Kuivalainen, Sundqvist & Servais 2007). Therefore, it is

expected that firms with prior export experience or international orientation may achieve a higher competitive advantage, especially in internationalisation, from the use of the CFC program. Therefore, prior involvement in export activities is considered as a control variable in this study. Firms are asked in the questionnaire to indicate if they have exported into international markets during the past five years. This response is coded as a binary yes/no variable. Similarly, if firms have been using more than one support programs, then it is more likely that their competitiveness and dynamic capabilities may be higher than those who have been using only the given CFC program. Physical closeness/proximity of the SME to the CFC facilities is also considered a potential factor that may affect the ability of user SMEs to gain higher competitiveness benefits from the use of the CFC program. Higher and/or easy access to financial and non-financial resources has been identified as a strong predictor of various performance outcomes in SMEs (Anderson & Eshima 2013; John & Pouder 2006; Li & Geng 2012). Usage of multiple support programs is coded as binary yes/no variables, whereas closeness to CFC is measured in distance in kilometres and is coded in categories of less than 2 kilometres through more than 12 kilometres.

Since this study used structural equational modelling to test main hypotheses which is sensitive to complexity of model Spector and Brannick (2011), so following the tradition (Carlson & Wu, 2012) all control variables were tested through regression for their possible influence on the dependent variables in the presence of independent variables. The findings revealed that only span of operations related significantly to international performance, however the main effect of independent and dependent variable was not significant. Also, the overall pattern and statistical significance of the findings almost remained the same in the presence and absence of this control

variables in the tested regression model and then structural model later on. According to Becker (2005) and Spector and Brannick (2011), the inclusion of nonsignificant (or meaningless) control variables might be unnecessary and even undesirable because it can reduce statistical power or distort the relationships among the main study variables. Thus, it was not included in the subsequent main SEM hypotheses and the results were reported without the control variables (Chun, Shin, Choi, & Kim, 2013).

4.11 RELIABILITY AND VALIDITY

Researchers suggest three important aspects of validity: content, convergent, and discriminant validity that must be met to claim a research truly scientific and valid (Venkatraman & Grant 1986). A detailed description of convergent and discriminant validity is provided in the data analysis and findings chapter. Here, only content validity is discussed. Content validity ensures that the items included in the questionnaire truly represent the constructs that they are made to measure (Zikmund et al. 2013). There is no statistical way to ensure content validity and thus researchers' judgement, expertise, and understanding of the literature ensure this aspect of validity (Garver & Mentzer 1999). This study used a rigorous, multi-step process to understand the literature and then engaged with experts to validate the relevance and suitability of dimensions and items of all constructs.

Reliability ensures that the measurement was free of any error and the instrument will produce the same accuracy when applied in a different context (Hair et al. 2010). Good reliability of an instrument indicates that the collected data is reliable to test the hypothesis and make inferences. There are different methods to check reliability such as Cronbach's Alpha, and reliability coefficients of structural equation modelling

(Venkatraman & Grant 1986). The current research used Cronbach's Alpha with a score of >0.70 establishing the scale's reliability (Nunnally 1978). Results are presented in the data analysis and findings chapter.

4.12 COMMON METHOD BIAS

Common method bias is a potential measurement problem for survey-based studies that use perceptual measures and collect data about independent and dependent variables from a single source. This can cause serious problems with the reliability of data if due consideration is not taken (Chang, van Witteloostuijn & Eden 2010; Podsakoff et al. 2003). The literature has suggested various steps to deal with this issue, such as collecting data from multiple sources, development of questionnaires following professional guidelines, partial correlation, using the marker technique, and Harman's one-factor approach (Chandler & Hanks 1993; Chang, van Witteloostuijn & Eden 2010; Podsakoff et al. 2003).

In this study, a number of pre- and post-data collection measures were adopted to minimise common method bias. First, the questionnaire was developed by rigorously following professional guidelines and by adopting previously validated scales. Second, two responses were sought—one from the SME CEO and another from the head of production. As many SMEs did not provide two responses, it was not possible to use accumulative scores of two responses. However, a comparison (t-test) between first (CEO) and second (Head of Production) responses did not find any statistically significant difference. This technique demonstrated that the CEO and non-CEO responses about independent and dependent variables were similar. Third, the information about independent variables (use of CFC facilities) was collected from two sources (i.e., from CFC and user SMEs). Objective data about the use of CFC facilities

was obtained from CFCs and compared with what SMEs had reported in their feedback. The comparison was made by the researcher by using subjective and expert judgement and no major difference was found between SMEs reported use of CFC facilities and what the CFC administration record depicted.

Finally, SME rating of competitive performance was cross-verified by industry experts. In every cluster in which the CFC program was operating, there was also an Industry Association working for that cluster. The Industry Association consisted of players from the respective industry (SMEs), development agencies, and Chamber of commerce. These people maintain close relationships with SMEs to help them improve their business operations and performance. Association members are knowledgeable about the operations and overall market standing of SMEs. Members of Associations were contacted to seek their rating about the competitiveness of SMEs that were engaged with CFCs. A list of respondent SMEs was shared with them and they were asked to identify those SMEs whom they knew closely and could comment on competitiveness more confidently. In every cluster, almost 30 to 40% of SMEs were known well by those experts. After identifying those SMEs, a separate form containing the same information about four competitiveness dimensions (i.e., production, innovation, internationalisation, and market) was given to those experts by mentioning the name of the SME. Association experts were asked to rate the performance of known SMEs on the four competitiveness dimensions by using the same seven-point Likert rating scale that SMEs had used in their response. After collecting responses from those experts, a comparison was made between SME self-rating and expert rating about SME competitiveness. T-tests found little variation in mean scores and no statistically significant difference between both responses. This process provided further justification that the common method bias was not an issue in this study.

To further investigate the common method bias, Harman's one-factor method was used (Chang, van Witteloostuijn & Eden 2010). Many previous studies have used this approach to refute the possibility of the existence of common method bias (see Anderson & Eshima 2013; Chen, HL & Hsu 2013; Dai et al. 2014; Su, Xie & Wang 2015). Un-rotated exploratory factor analysis (EFA) is used to verify if a single factor constitutes the majority of the variance between measurements. The results of EFA produced five factors with an Eigenvalue greater than one, where the first factor explained 36% of variance among the total 61%. Further, a confirmatory factor analysis (CFA) with a single latent factor loading produced a poor model-fit (CMIN/DF=9.267, CFI= .624, RMSEA=0.435). These statistical measures along with t-test scores suggest that common method bias was not a serious problem in this study.

CHAPTER 5: DATA ANALYSIS

The main objective of this research study is to investigate the impact of the use of the CFC program on the competitiveness of user SMEs by considering the moderating role of SME ACAP and NCAP in this relationship. Quantitative data was collected using a structured questionnaire. This study intends to apply structural equation modelling (SEM) to analyse collected data and test hypotheses. SEM is a very popular and widely adopted statistical technique to analyse data and test hypotheses robustly (Hair et al. 2010; Kline 2005). To undertake robust statistical analysis, the data must go through a certain set of tests such as missing values, outliers, normality, and factor analysis (Schreiber et al. 2006; Straub, Boudreau & Gefen 2004).

Therefore, the following steps are followed to achieve the robustness of data analysis and findings:

Step 1 – Data cleaning and purification by identifying and fixing missing values, outliers and normality issues

Step 2 – Reliability and validity measurement through Cronbach's alpha, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA)

Step 3 – Structural model evaluation to check the validity of the structural model through most adopted threshold standards

5.1 MISSING VALUES ANALYSIS

Missing values in data refer to a situation where values on main variables of interest are not available to undertake the analysis. Missing data is a common problem in surveys that affects the robustness of data analysis (Tabachnick & Fidell 2007). In this study, the missing data was checked by calculating the frequencies of each variable. There were few random missing values in some variables (less than 1% in each

missing response), which were fixed by using the means values imputation/substitution method (Hair et al2010; Pallant 2007; Tabachnick & Fidell 2007).

5.2 OUTLIERS

Outliers are cases that have values that substantially deviate from other cases and thus cannot be attributed as representatives of the population (Byrne 2010; Hair et al. 2010). Outliers potentially undermine the robustness of data and consequent analysis and thus need to be identified and fixed. There are different methods of analysis such as univariate, bivariate or multivariate, to identify outliers in data. Univariate outliers were assessed by calculating standard scores (z scores) of each variable (Tabachnick & Fidell 2007). Cases with a z score greater than 3.29 ($p<.001$, two-tailed) are considered potential outliers. In this study, the z scores of all variables were less than 3.00 which refuted the possible presence of univariate outliers in the dataset.

To identify multivariate outliers, Mahalanobis distance (D2) was used. Mahalanobis distance (D2) is the most common method that uses a multivariate approach to estimate the squared Mahalanobis distance (D2) for each case to detect extreme scores on two or more variables (Hair et al. 2010; Kline 2005). D2 estimation identifies outliers by calculating the mean score of all cases and then compares the difference of each case with that mean score. In the case of massive deviation or higher values of D2 from the mean score, the case is highlighted as an outlier. A conservative significance level ($p<0.001$) is also considered a standard cut-of point to detect multivariate outliers (Kline 2005).

In this study, the dataset of 236 cases was assessed using Mahalanobis distance (D2) and a probability level of $p<0.001$ in SPSS for the possible presence of outliers. A significance level of <0.001 identified 9 cases, whereas the mean score deviation

identified 12 cases. All these outlier cases (i.e., case #. 114, 128, 99, 127, 95, 224, 210, 61, 108, 102, 66, 90) were finally removed from the data set.

5.3 NORMALITY OF DATA

Normal distribution of data is critical for robust statistical analysis especially when multivariate analyses is conducted by using SEM or AMOS technique (Byrne 2010; Hair et al. 2010). A non-normal distribution of data negatively affects the chi-square value and consequently overall goodness-of-fit indices of AMOS models (Byrne 2010). Normality of data refers to the normal distribution of observations for a single metric variable based on the distribution of data and its statistical attributes (Hair et al. 2010). A significant deviation from normality may undermine the strength of statistical reasoning (Hair et al. 2010).

The normality test is conducted by estimating skewness and kurtosis scores to identify any serious departure of data from normality (Ghasemi & Zahediasl 2012). Skewness and kurtosis are very common and widely-adopted tests to check normality. There are objective (statistical values) and subjective ways (plots) to analyse normal distribution in data. However, in this study the objective measure (i.e., the statistical method) is adopted due to its higher objectivity and ease of understanding (Hair et al. 2010). Skewness tests indicate if the distribution of data is more centred or positively or negatively tilted, whereas kurtosis identifies the ‘peakiness’ or ‘flatness’ of data. According to Hair et al. (2010), critical values ranging between -2.58 to +2.58 (0.01 significance level) for skewness, and -1.96 to +1.96 (0.05 significance level) for surtosis, can be used as cut-off points to establish normality. Kline (2010) suggests that critical values ranging between -10 to +10 for kurtosis may be considered normal. Byrne (2010) argues that large sample sizes mitigate the negative effect of non-

normality on results. Hair et al. (2010) argue that any serious departure from normality may not have a serious effect on results if the sample size exceeds 200 cases. Construct-wise and item-wise tests for skewness and kurtosis were conducted. All the constructs demonstrated satisfactory values for skewness and kurtosis: 1) CFC usage: Skewness = .430, Std. Error = .163, Kurtosis = -1.204, Std. Error = .324, 2) ACAP: Skewness = -.763, Std. Error = .163, Kurtosis = .676, Std. Error = .324, 3) NCAP: Skewness = -.133, Std. Error = 0.163, Kurtosis = .544, Std. Error = 0.324, 4) Innovation Competitiveness: Skewness = -.529, Std. Error = 0.163, Kurtosis = .122, Std. Error = 0.324, 5) Production Competitiveness: Skewness = -.591, Std. Error = 0.163, Kurtosis = .840, Std. Error = 0.324, 6) Internationalisation Competitiveness: Skewness = -.296, Std. Error = 0.163, Kurtosis = -1.333, Std. Error = 0.324, 7) Skewness = -.681, Std. Error = 0.163, Kurtosis = 1.089, Std. Error = 0.324. Item-wise scores of skewness and kurtosis can be seen in Table 5.1. All values are within the acceptable range, which establishes that the data is not exposed to serious issue of non-normality.

Table 5.1:Item-wise Scores of Skewness and Kurtosis Test

	Skewness		**Kurtosis**			**Skewness**		**Kurtosis**	
Variables	Statistics	Std. Error	Statistics	Std. Error		Statistics	Std. Error	Statistics	Std. Error
Use-1	.285	.163	-1.273	.324	Inno1	-.697	.163	.278	.324
Use-2	.295	.163	-1.221	.324	Inno2	-.541	.163	-.154	.324
Use-3	-.170	.163	-1.188	.324	Inno3	-.347	.163	-.271	.324
Use-4	.433	.163	-1.274	.324	Inno4	-.360	.163	-.316	.324
Use-5	.596	.163	-1.110	.324	Prodn1	-.271	.163	-.246	.324
Use-6	.278	.163	-1.292	.324	Prodn2	-.094	.163	-.679	.324
Use-7	.478	.163	-1.209	.324	Prodn3	-.337	.163	.033	.324
Use-8	.623	.163	-.964	.324	Prodn4	-.611	.163	.700	.324
Use-9	.344	.163	-1.355	.324	Prodn5	-.553	.163	.260	.324
ACAP1	-.689	.163	-.446	.324	Prodn6	-.660	.163	.661	.324
ACAP2	-.645	.163	.339	.324	Prodn7	-.441	.163	.139	.324
ACAP3	-.450	.163	.004	.324	Prodn8	-.730	.163	.417	.324
ACAP4	-.753	.163	.793	.324	Prodn9	-.406	.163	-.499	.324
ACAP5	-.834	.163	.414	.324	Prodn10	-.442	.163	-.005	.324
ACAP6	-.579	.163	-.147	.324	Prodn11	-.689	.163	1.224	.324
ACAP7	-.606	.163	-.196	.324	Prodn12	-.605	.163	-.076	.324
ACAP8	-.390	.163	-.091	.324	Prodn13	-.492	.163	.507	.324
ACAP9	-1.087	.163	.898	.324	Prodn14	-.768	.163	.231	.324
ACAP10	-.652	.163	.196	.324	Prodn15	-.451	.163	.345	.324
ACAP11	-.532	.163	-.264	.324	Int'l1	-.229	.163	-1.354	.324
ACAP12	-.773	.163	.673	.324	Int'l2	-.190	.163	-1.348	.324
NCAP1	-1.202	.163	2.113	.324	Int'l3	-.207	.163	-1.346	.324
NCAP2	-.725	.163	-.370	.324	Int'l4	-.243	.163	-1.200	.324
NCAP3	-.483	.163	-.636	.324	Int'l5	-.178	.163	-1.349	.324
NCAP4	-.527	.163	-.576	.324	Int'l6	-.020	.163	-1.255	.324
NCAP5	-.819	.163	.487	.324	Int'l7	-.171	.163	-1.377	.324
NCAP6	-.527	.163	-.391	.324	Mrkt1	-.686	.163	.300	.324
NCAP7	-.448	.163	-.963	.324	Mrkt2	-.535	.163	.218	.324

NCAP8	-.449	.163	-.829	.324	Mrkt3	-.478	.163	.247	.324
NCAP9	-.248	.163	-.495	.324	Mrkt4	-.375	.163	.220	.324
NCAP10	-.415	.163	-.698	.324	Mrkt5	-.635	.163	.136	.324
					Mrkt6	-.618	.163	.333	.324

5.4 RESPONDENT PROFILES

Information about respondent SMEs is provided in Table 5.2. Respondents in this study were CEOs/owners/directors of SMEs who have been using facilities and services of the CFC program of the GOP. Data was collected about the usage of the CFC program by each SME, along with the current level of ACAP and NCAP of respective SMEs. As the level of analysis of this study was the firm or SME, the profile of respondents included various factors related to SME characteristics. No data related to personal characteristics of respondents (i.e. CEOs/owners/directors) was obtained as it was not required for any part of the analysis.

In terms of size of respondent firms, the majority of firms (N = 219, 53.6%) fell into the ‘small’ category with employment ranging from 50–100 employees, followed by ‘micro’ firms (27.7%) with employment ranging between 11–50 employees. Finally, 10.7% were ‘medium’ sized firms with employment ranging between 101 and 250 employees. Only 5.8% of firms had between 251 and 500 employees.

In terms of firm age, which can be used as a proxy of industry experience, the majority of respondent firms (N = 222, 63.4%) had been working in their respective industries for more than 12 years followed by 16.2% working for 9 to 12 years.

Most firms (N = 199, 58.5%) had owner-managers in charge of operations and decisions. 30% of firms were being run by professional CEOs instead of owners.

Most firms (N = 224, 53.1%) were family businesses; the rest (46.9%) were run by professional managers or non-family employees/managers.

Most firms (N = 224, 50.4%) were owned by a sole proprietor; 20.1% had a partnership and 29.5% had a private limited ownership structure.

Most firms (N = 224, 71.9%) were running or being managed by the same founder entrepreneur who originally established that firm. However, 28.1% of firms were being run or managed by the non-founder entrepreneur.

Most firms (N = 222, 76%) have been using the targeted CFC program for the past six years followed by 8.4% for the past 3 years, and 15.6% from more than six years.

Most firms (N=224, 78.6%) had been using CFC facilities and services from a single CFC centre whereas 21.4% firms had received such facilities from more than one CFC centre located in their respective clusters. Among those firms who had used more than one CFC program, 16.1% (N=48) have received technological facilities from other CFC, 1.3% have received skills related support, whereas 14.7% have used both technological and skills related facilities from other CFC centres. It is to clarify that the respondent SMEs were selected who were taking services from a specific CFC. However, in some industries, multiple CFCs were operating, and some firms were using services from multiple CFCs. So, it was important to know that if SMEs were using only single or multiple CFCs because this may have a differential impact on their competitiveness performance and ability to use combined knowledge to receive better competitiveness benefits from the use of each CFC.

Majority of firms (N=224) i.e. 86.6% have not used any public or private financial grant during the time they had been working with the given CFC at least. Whereas 13.4% firms have received financial grants from government or private financial institutions.

In terms of export involvement, there is almost balance in the sample as 48.7% firms are already involved in exporting whereas rest 51.3% have never got involved in exporting products to overseas markets. Among the exporting firms' pool, around 78% of firms have been exporting for past more than 6 years.

In terms of overall resource strength (both financial and non-financial), the majority of the firms (N=224) i.e. 48.2% perceive that they have a mediocre level of resources whereas 40.2% think their resources are strong as compared to the overall position in the industry during the past 3 years. 4.5% firms think their resources are relatively weak whereas 7.1% firms perceived their overall resources very strong compared with the overall industry situation.

Majority of firms (N=223) i.e. 58.9% have expanded their production processes and infrastructure during the past 3 years whereas 36.9% of firms have not done any expansion in their production processes and infrastructure.

In terms of the relative quality and strength of production machinery and equipment, the majority of firms (N=179) i.e. 41.3% think that the quality of their production equipment is as per industry average, followed by 34.1% who perceive it better than others, and 15.1% who think they have state of the art production equipment. Only 7.2% of firms think their production equipment is either below the industry average or very bad.

Majority of firms (N=219) i.e. 78.6% maintain a record of their production activities such as unit cost, scrap rate, productivity (input-throughput-output ratios) etc.

Majority of firms (N=176) i.e. 54% are located within 5-kilometre radius where CFC is located, followed by 23.5% from 6-10 kilometres and 20.1% more than 10 kilometres away from CFC location.

Table 5.2: Demographics of Respondent SMEs

Size of Firm (N=219)	**Frequency**	**Percent (%)**
Micro (Less than 50 employees)	62	28.3
Small (51 to 150 employees)	120	54.8
Medium (151 to 250 employees)	24	11.0
Large (251 to 350 employees)	13	5.9
Age of Firm (N=222)		
Less than 1 year	3	1.4
1-4 years	17	7.7
5-8 years	24	10.8
9 -12 years	36	16.2
more than 12 years	142	64.0
Owner Manager (N=199)		
Yes	131	65.8
No	68	34.2
Family Business (N=224)		
Yes	119	53.1
No	105	46.9
Ownership Structure (N=224)		
Sole Proprietorship	113	50.4
Partnership	45	20.1
Private Ltd.	66	29.5
Founder and Manager (N=224)		
Founder and Manager is the same person	161	71.9
Founder and Manager are different persons	63	28.1
Use of Multiple CFCs (N=224)		
Yes	48	21.4
No	176	78.6
Nature of other CFC use (N=48)		
Technological	36	75.0
Skills	12	25.0
Both (technological and skills)	33	
Use of Financial Grant (N=224)		
Yes	30	13.4
No	194	86.6

Export Involvement (N=224)		
Yes	109	48.7
No	115	51.3
Overall Resource (financial and non-financial) Strength		
Weak	10	4.5
Mediocre	108	48.2
Strong	90	40.2
Very Strong	16	7.1
Production Expansion in Past 3 Years (N=224)		
Yes	132	58.9
No	92	41.1
Production Equipment Strength (N=224)		
State-of-the-art	39	17.4
Better than others	82	36.6
As per Industry Average	90	40.2
Below than industry average	12	5.4
Very Bad	1	.4
Record Keeping of Production Activities (N=218)		
Yes	176	80.7
No	42	19.3
Distance Between SME and CFC (N=176)		
Less than 2 KM	43	24.4
3-5 KM	55	31.3
6-10 KM	42	23.9
More than 10 KM	22	12.5

5.5 RELIABILITY SCORES

Reliability of items in the construct is measured using Cronbach's alpha coefficient by assessing the correlation of items in the instrument. According to Hair et al. (2010), alpha coefficients above 0.70 are considered good to declare internal consistency of data. Kline (2010) asserts that a value of alpha coefficient of 0.70 is adequate, 0.80 is very good, and 0.90 is excellent. As can be seen in Table 5.3, the alpha coefficient values of all measurement scales in the construct range from 0.863 to 0.989 and thus can be considered as very good to excellent. The overall alpha for all items in the

instrument is 0.954, which is excellent. These high-reliability scores thus establish that the data is highly reliable for further analyses.

Table 5.3: Reliability Scores of Instrument Items

Measurement Scales	Number of	Cronbach's	Consistency
CFC Use	9	0.931	Excellent
Networking Capability	10	0.883	Very Good
Absorptive Capacity	12	0.942	Excellent
Innovation Competitiveness	4	0.863	Very Good
Production Competitiveness	15	0.946	Excellent
International Competitiveness	7	0.989	Excellent
Market Competitiveness	6	0.924	Excellent
Complete Scale	63	0.954	Excellent

Further to reliability scores, Kline (2010) suggests that an analysis of item-total correlation should be conducted to identify the potentially uncorrelated items that do not exactly measure the phenomenon of interest, which other items do. If all items in a construct measure the same phenomenon of interest, then the score of each item with respect to the whole construct must be highly correlated. According to Pallant (2011) if the item-total correlated score is less than 0.3 then the respective item in the construct is not measuring the same construct. Given this, the item-total correlation was undertaken and the outcome scores, given in Table 5.4, show that all the items in the respective construct are highly correlated as the corrected item-total correlation score of all items is above 0.3. This establishes the accuracy of the selection of items for the measurement of different constructs.

Table 5.4: Item-total Correlations of the Construct Items

Items	Corrected Item-total Correlation	Items	Corrected Item-total Correlation
Networking Capability			
NCAP-1	.570	NCAP-6	.732
NCAP-2	.659	NCAP-7	.714
NCAP-3	.567	NCAP-8	.711
NCAP-4	.438	NCAP-9	.744
NCAP-5	.406	NCAP-10	.681
Absorptive Capacity			
ACAP-1	.640	ACAP-7	.792
ACAP-2	.692	ACAP-8	.785
ACAP-3	.728	ACAP-9	.788
ACAP-4	.721	ACAP-10	.773
ACAP-5	.688	ACAP-11	.719
ACAP-6	.752	ACAP-12	.740
Innovation Competitiveness			
Innovation Comp- 1	.676	Innovation Comp- 3	.654
Innovation Comp- 2	.751	Innovation Comp- 4	.772
Production Competitiveness			
Production Comp-1	.446	Production Comp-9	.700
Production Comp-2	.620	Production Comp-10	.725
Production Comp-3	.766	Production Comp-11	.728
Production Comp-4	.709	Production Comp-12	.765
Production Comp-5	.769	Production Comp-13	.727
Production Comp-6	.672	Production Comp-14	.726
Production Comp-7	.780	Production Comp-15	.803
Production Comp-8	.774		
Internationalisation Competitiveness			
International Com-1	.948	International Com-5	.960
International Com-2	.972	International Com-6	.941
International Com-3	.963	International Com-7	.963
International Com-4	.966		
Market Competitiveness			
Market Comp-1	.736	Market Comp-4	.779

Market Comp-2	.759	Market Comp-5	.790
Market Comp-3	.779	Market Comp-6	.839

5.6 EXPLORATORY FACTOR ANALYSIS

Exploratory factor analysis (EFA) was conducted to estimate the validity of scales and also produce a manageable and relevant pool of items (Hair et al. 2010). EFA is usually recommended when there is uncertainty if the employed construct contains single or multiple dimensions (Russell 2002). Since most of the items used in this study were adapted from multiple sources and those constructs and items have never been tested and validated in this study's context before, it was logical to apply EFA to identify the connection of items to their respective constructs (Anderson & Gerbing 1988). Since different items estimated different constructs, EFA was applied individually to each construct—except the use of CFC program as it is not a latent variable and thus is measured directly. Other constructs were latent and thus measured through different observable variables. To establish the suitability of the EFA model, factorability was measured through the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) and Bartlett's test of sphericity (Hair et al. 2010; Pallant 2011). According to Hair et al. (2010), a KMO score between 0.5 and 1.0, and significance of Bartlett's test of sphericity (<0.05), establish that the data is factorable. However, Tabachnick and Fidell (2007) suggest a KMO score above 0.6 to establish factorability of data using an EFA model. To extract factors required to present items' structure, the principal component analysis (PCA) method was used. The Hair et al (2010) criterion of the percentage of variance (60% or less of the total variance explained) was used to identify the ability of factors to explain the variance. Factors with an eigenvalue more than 1 were kept in the EFA model. However, Hair et al (2010) suggest that the

conceptual understanding must be used by the researcher in combination with statistical values while deciding to keep or delete any specific item in the construct. The varimax rotation method was used to obtain a rotated solution for the EFA model. The rotated solution is the most commonly used approach to obtain clear loading of items on their respective factors (Tabachnick & Fidell 2001). To decide on the appropriate loading of items, a significant correlation between items and factor is sought. The Hair et al (2010) cut-off factor loading of 0.5 was used to establish that the item was significantly correlated with its factor. In case of cross-loading of the item with above 0.5 scores on more than one dimension, the item was deleted (Costello & Osborne 2005).

EFA was conducted twice for the NCAP construct as the initial factor solution could not produce satisfactory loadings. Table 5.5 shows that all the 10 items loaded on 2 factors with a factor loading score above 0.5. Ten items explained 66.39% variance with KMO above .80 and Bartlett's test of sphericity significant at .0001 level. However, three items loaded on both factors with above 0.5 loading scores, and therefore were deleted.

Another EFA was run with seven items to check for the appropriateness of item loading. Table 5.6 shows that all the items were loaded with appropriate scores (i.e., above 0.5 on 2 factors). Total variance explained increased to 71.13% with KMO above 0.7 and Bartlett's test of sphericity significant at .0001. The increment in almost all items loading scores and total variance explained indicates that the deletion of three items improved the overall strength of factor model. The identified two factors are named Technical Networking (Factor 1) and Knowledge-based Networking (Factor 2). Cronbach's alpha of the revised seven items scale yielded .809 score. Corrected item-total correlation was also above the acceptable limit. Communalities values of each

observed variable were also checked to measure the variability being explained by the extracted factors which were above the acceptable level i.e. >0.3 (Pallant 2007).

Table 5.5: Initial Factor Loadings of Networking Capability Construct

	Factor 1	Factor 2
NCAP – 1	.642	
NCAP – 2	.893	
NCAP – 3	.805	
NCAP – 4		.851
NCAP – 5		.809
NCAP – 6	.789	
NCAP – 7	.838	
NCAP – 8	***.596***	***.521***
NCAP – 9	***.600***	***.552***
NCAP – 10	***.511***	***.599***
Total Variance Explained = 66.39%		

Table 5.6: Revised Factor Loadings of Networking Capability

	Factor 1	Factor 2
NCAP – 1 (Suppliers)	.677	
NCAP – 2 (Customers)	.904	
NCAP – 3 (Competitors)	.812	
NCAP – 4 (Research Institutions).		.835
NCAP – 5 (Export Promotion Institutions)		.899
NCAP – 6 (Financial Institutions)	.808	
NCAP – 7 (Chambers/Association)	.843	
Total Variance Explained = 71.13%		

ACAP's EFA produced a single factor explaining 61.13% of the variance. Loadings of all 12 items, as shown in Table 5.7, were above the acceptable level of 0.50 ranging from 0.689 to 0.834; therefore, all were kept for further analysis. The original ACAP construct contains four dimensions; however, in this study's context, only one

dimension of ACAP emerged. Forced EFA to load 12 items on four dimensions was also conducted; however, only one factor emerged with an eigenvalue above 1. This loading seems strange as no previous studies have reported such one-dimensional loadings of ACAP. To further validate this loading, confirmatory factor analysis (CFA) was conducted later to determine if the model fit appeared better with a single factor and four factors.

Table 5.7: Factor Loadings of the Absorptive Capacity Construct

	Factor 1
ACAP – 1	.689
ACAP – 2	.741
ACAP – 3	.770
ACAP – 4	.774
ACAP – 5	.736
ACAP – 6	.802
ACAP – 7	.834
ACAP – 8	.830
ACAP – 9	.828
ACAP – 10	.818
ACAP – 11	.768
ACAP – 12	.791
Total Variance Explained = 61.13%	

The EFA for innovation competitiveness produced a single factor explaining 71.28% of the total variance. Loading of all four items, as shown in Table 5.8, were above the acceptable level of 0.50 ranging from 0.802 to 0.883 with KMO .819 and Bartlett's test of sphericity significant at .000; therefore, all items were kept for further analysis.

Table 5.8: Factor Loadings of the Innovation Competitiveness Construct

	Factor 1
Innovation Comp – 1	.689
Innovation Comp – 2	.741
Innovation Comp – 3	.770
Innovation Comp – 4	.774
Total Variance Explained = 71.28%	

For production competitiveness, the EFA was conducted twice as the initial factor solution could not produce satisfactory loadings. Table 5.9 shows that all the 15 items loaded on 2 factors with a factor loading score above 0.5. The identified two factors explained 65.45% variance with KMO .933 and Bartlett's test of sphericity significant at .000. However, in the rotated solution, three items showed loadings on both factors with a score of above 0.5, and therefore were deleted.

Another EFA was run with 12 items to check for the appropriateness of item loading and factor structure. Table 5.10 shows that all the items were loaded with appropriate scores (i.e. above 0.5 on two factors). Total variance explained was 65.87% with KMO 0.911 and Bartlett's test of sphericity significant at .000. The identified two factors were named cost and product competitiveness (Factor 1) and delivery and equipment competitiveness (Factor 2). Cronbach's alpha of the revised 7 items scale was .809. The corrected item-total correlation was also above the acceptable limit. Communality values of each observed variable were also checked to measure the variability being explained by the extracted factors, which were above the acceptable level i.e. >0.3 (Pallant 2007)

Table 5.9: Initial Factor Loadings of the Production Competitiveness

	Factor 1	Factor 2
Production Comp – 1		.796
Production Comp – 2		.618
Production Comp – 3	.673	
Production Comp – 4	.755	
Production Comp – 5	.755	
Production Comp – 6	.768	
Production Comp – 7	***.625****	***.532****
Production Comp – 8	***.568****	***.593****
Production Comp – 9		.753
Production Comp – 10		.716
Production Comp – 11	.650	
Production Comp – 12	.737	
Production Comp – 13	.799	
Production Comp – 14	.808	
Production Comp – 15	***.635****	***.551****
Total Variance Explained = 65.45%		

* Items removed from the final list

Table 5.10: Revised Factor Loadings of the Production Competitiveness

	Factor 1	Factor 2
Production Comp – 1		.841
Production Comp – 2		.615
Production Comp – 3	.687	
Production Comp – 4	.767	
Production Comp – 5	.763	
Production Comp – 6	.771	
Production Comp – 9		.742
Production Comp – 10		.699
Production Comp – 11	.667	
Production Comp – 12	.754	
Production Comp – 13	.807	
Production Comp – 14	.808	
Total Variance Explained = 65.87%		

The EFA for internationalisation competitiveness produced a single factor explaining 94.1% of the total variance. Loading of all 7 items, as shown in Table 5.11, was far

above the acceptable level of 0.50 ranging from 0.956 to 0.980 with KMO .914 and Bartlett's test of sphericity significant at .000; therefore, all items were kept for further analysis.

Table 5.11: Factor Loadings of the Internationalisation Competitiveness

	Factor 1
Internationalisation Comp – 1	.962
Internationalisation Comp – 2	.980
Internationalisation Comp – 3	.973
Internationalisation Comp – 4	.975
Internationalisation Comp – 5	.970
Internationalisation Comp – 6	.956
Internationalisation Comp – 7	.973
Total Variance Explained = 94.1%	

The EFA for market competitiveness produced a single factor explaining 72.44% of the total variance. Loading of all five items, as shown in Table 5.12, was above the acceptable level of 0.50 ranging from 0.816 to 0.895 with KMO .918 and Bartlett's test of sphericity significant at .000; therefore, all items were kept for further analysis.

Table 5.12: Factor Loadings of the Market Competitiveness

	Factor 1
Market Comp – 1	,816
Market Comp – 2	.834
Market Comp – 3	.851
Market Comp – 4	.851
Market Comp – 5	.858
Market Comp – 6	.895
Total Variance Explained = 72.44%	

5.7 CONFIRMATORY FACTOR ANALYSIS

CFA with the maximum likelihood approach was conducted for all latent variables to identify a cohesive measurement structure along with its validity and reliability. CFA

provides an absolute estimation by assessing the structure of factors and matching their pattern of loadings with data (Hair et al. 2010). This helps researchers to find support or justification for refining an existing model (DiStefano & Hess 2005). To determine the fitness of factor model for data, model fit indices were examined. Usually, the model is accepted if the fit indices or parameters are found within an acceptable range. In case of unacceptable fit indices, the model is respecified or refined to obtain model fit. Traditionally, Chi-square (χ^2) statistics with a degree of freedom (df) and significance level (p-value) are considered as fit parameters. However, due to the sample size sensitivity of Chi-square (χ^2), researchers suggest using multiple alternative fit indices to determine the extent of model fit (Kline 2010; Shah & Goldstein 2006). There are several alternative indices that previous researchers have used and suggested. However, Hair et al. (2010) suggest that alonside Normed chi-square (χ^2/df), one must report at least one incremental index (i.e. CFI or TLI) and one absolute index (i.e. RMSEA or SRMR). In this study Normed chi-square (χ^2/df), Comparative-fit index (CFI), Goodness-of-fit index (GFI), Adjusted-goodness-of-fit index (AGFI), and Root-mean-square error of approximation (RMSEA) were used as fit indices to determine model fit both for CFA and SEM at a later stage. By following the guidelines provided by Byrne (2010), Kline (2010), and Hair et al. (2010) the following measures/scores of fit indices were used to determine model fit, as demonstrated in Table 5.13.

Table 5.13: Parameters of Good Model Fit

Fit Indices	Criterion
Chi-square (χ^2/df)	< 5
Comparative-fit index (CFI)	>0.90
Goodness-of-fit index (GFI)	>0.80
Adjusted-goodness-of-fit index (AGFI)	>0.90
Root mean-square error of approximation	Values < 0.08/0.10

5.7.1 CFA Outcomes

The CFA model of SME NCAP could not meet any of critical good model fit requirements (CMIN/DF=8.708, CFI=.717, GFI=.811, AGFI= .774, RMSEA=0.164 Sig @.000 p-value). The inadequate fit of the model is somehow common in CFA and thus there are some suggested modifications based on goodness-of-fit indices and theoretical justifications (Byrne 2010). In light of the literature's guidelines, the first modification was made by allowing the measurement errors of observed items of latent variables to covariate with each other (Byrne & Shavelson 1996). The main assumption behind this correlated error approach is that the measurement errors of observed items of latent variables do not fall in an ideal random pattern, potentially due to redundancy of items content, response bias, and/or close-ended questions or yes/no questions (Byrne & Shavelson 1996). In this study, since all the measures were designed on the seven-point Likert scale and common-method bias was not found, the only possibility of correlated error could be items' content redundancy. Seven correlated errors were made step-by-step by following modification indices, which substantially improved the fit indices. However, the obtained fit indices value still could not meet the requirement of good fit (CMIN/DF=4.708, CFI=.817, GFI=.871, AGFI= .874, RMSEA=0.124 Sig @.000 p-value). In the next attempt to achieve a model fit, items with low factor loadings and/or high correlated errors were identified and removed one-by-one (Schumacker & Lomax 1996). After removing each item on a one-by-one basis, the whole CFA model was run again from scratch with new justifiable correlated errors. After running and rerunning the model seven times and using different combinations of theoretically justifiable items, substantial improvement in fit indices finally achieved the good model fit with CMIN/DF=1.952, CFI=.995, GFI=.991, AGFI= .957, and RMSEA=.071 (p=0.346).

As shown in Figure 5.1, the factor loading of retained items was above the threshold level of 0.70 with a significant p-value <0.001, establishing the convergent validity of the construct. The SMC value of two items was above the generally acceptable level of 0.30, but below the threshold level of 0.50 being used in this study. In the purview of theoretical justification of these items (Hair et al. 2010), it was decided to keep them in the final NCAP construct. The final five-item single dimension networking construct, as shown in Figure 1, seems relevant and robust in terms of SMEs' attitude and orientation of networking in Pakistan. For instance, two removed items were related to networking with universities and research institutions (Dar, Ahmed & Raziq 2017). The literature indicates that SMEs in Pakistan are not into research-based partnerships or networks with educational and research institutions. Removal of networking with export promotion centres could be due to the fact that almost half of SMEs in this study's sample did not report their involvement in any exporting activity. Since this particular item was not relevant, its deletion theoretically makes sense. Therefore, it is reasonable to expect that exporting is not SMEs preference and thus they do not pursue this facility at CFC. Removal of networking with banking/financial institutions could also be due to the fact that almost 80% of sampled firms have never used a financial loan, which could mean this item was not relevant to their networking motivations. Similarly, one item related to networking with government officials could be due to Pakistan's bureaucratic culture and rare involvement of government officials, which means SMEs might consider them out of reach.

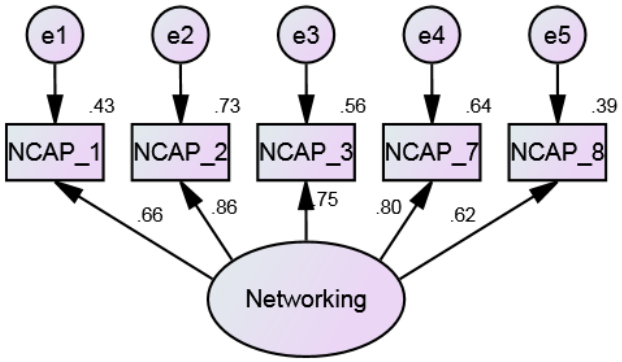


Figure 5.1: One-Factor Model for Networking Capability with Standardised Weights

Table 5.14 shows that the standardised regression weights of all the observed variables of NCAP construct were above the acceptable level of 0.5. Similarly, the t-value of all variables was above 1.96 (CR>1.96) with a significance level (p<0.001) that establishes that all the observed variables are significantly related to NCAP construct, thus verifying the convergent validity of the construct.

Table 5.14: Regression Weights of the Networking Capability Construct

Regression Weights			Estimate	S.E.	C.R.	P	Label
NCAP_1	<---	F1	1.000				
NCAP_2	<---	F1	1.711	.166	10.338	***	par_1
NCAP_3	<---	F1	1.455	.154	9.434	***	par_2
NCAP_7	<---	F1	1.715	.173	9.904	***	par_3
NCAP_8	<---	F1	1.323	.163	8.122	***	par_4

Standardized Regression Weights			
NCAP_7	<---	F1	.799
NCAP_3	<---	F1	.749
NCAP_2	<---	F1	.856
NCAP_1	<---	F1	.657

Twelve items CFA model of ACAP also could not meet the requirement of good model fit (i.e., CMIN/DF=8.246, CFI=.813, GFI=.758, AGFI= .650, RMSEA=0.180 Sig @.000). After going through the correlated error approach, few parameters of fit

indices improved to an acceptable level, but the overall goodness of fit model is still not to an acceptable level i.e. (CMIN/DF=5.246, CFI=.898, GFI=.818, AGFI= .790, RMSEA=0.114 Sig @.000). However, after removing six items (ACAP 6, ACAP 7, ACAP 8, ACAP 10, ACAP 11, ACAP 12) with low factor loadings (<0.70) and poor reliability scores (<0.50), the resulting goodness of fit statistics are CMIN/DF=2.103, CFI=.987, GFI=.976, AGFI= .937, and RMSEA=.070 insignificant with p-value 0.246. As shown in Figure 5.2, the factor loading of retained items was above the threshold level of 0.70 with a significant p-value (<0.001), establishing the convergent validity of the construct. Similarly, the SMC value of all items was above the threshold level of 0.50, which supports the reliability of variables.

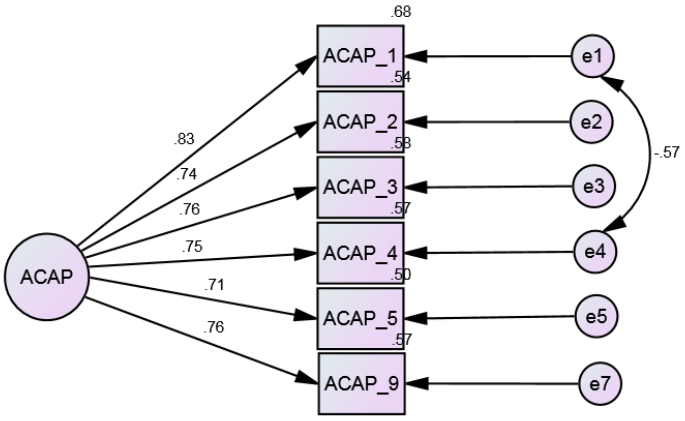


Figure 5.2: One-Factor Model for Absorptive Capacity with Standardised Weights

Table 5.15 shows that the standardised regression weights of all the observed variables of the ACAP construct were above the acceptable level of 0.5. Similarly, the t-value of all variables was above 1.96 (CR>1.96) with a significance level (p<0.001) that established that all the observed variables were significantly related to ACAP construct, thus verifying the convergent validity of the construct.

Table 5.15: Regression Weights of the Absorptive Capacity Construct

Regression Weights			Estimate	S.E.	C.R.	P	Label
ACAP_1	<---	F1	1.000				
ACAP_2	<---	F1	.818	.069	11.909	***	par_1
ACAP_3	<---	F1	.864	.070	12.404	***	par_2
ACAP_4	<---	F1	.923	.094	9.869	***	par_3
ACAP_5	<---	F1	.900	.079	11.327	***	par_4
ACAP_9	<---	F1	.919	.075	12.268	***	par_6

Standardized Regression Weights			Estimate
ACAP_1	<---	F1	.825
ACAP_2	<---	F1	.738
ACAP_3	<---	F1	.762
ACAP_4	<---	F1	.754
ACAP_5	<---	F1	.708
ACAP_9	<---	F1	.756

The CFA model of the innovation competitiveness seemed to meet the requirement of a highly adequate model fit indices with CMIN/DF=1.614, CFI=.997, GFI=.933, AGFI= .966, and RMSEA=.052 insignificant with p-value 0.366. As shown in Figure 5.3, the factor loading of retained items was above the threshold level of 0.70 with a significant p-value (<0.001), establishing the convergent validity of the construct. Similarly, the SMC value of all items was above the threshold level of 0.50, which supports the reliability of variables.

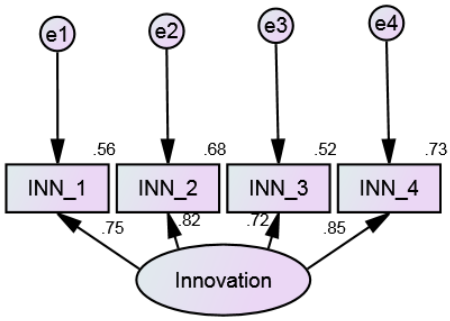


Figure 5.3: One-Factor Model for Innovation Competitiveness with Standardised Weights

Table 5.16 shows that the standardised regression weights of all the observed variables of innovation competitiveness construct were above the acceptable level of 0.5. Similarly, the t-value of all variables was above 1.96 (CR>1.96) with a significance level (p<0.001) that established all the observed variables were significantly related to the innovation competitiveness construct, thus confirming the convergent validity of the construct.

Table 5.16: Regression Weights of the Innovation Competitiveness Construct

Regression Weights			**Estimate**	**S.E.**	**C.R.**	**P**	**Label**
Innovation_ 1	<---	F1	1.000				
Innovation_2	<---	F1	1.041	.088	11.860	***	par_1
Innovation_ 3	<---	F1	.992	.096	10.365	***	par_2
Innovation_ 4	<---	F1	1.068	.088	12.192	***	par_3
Standardized Regression			**Estimate**				
Innovation_Competitive_1	<---	F1	.750				
Innovation_Competitive_2	<---	F1	.823				
Innovation_Competitive_3	<---	F1	.718				
Innovation_Competitive_4	<---	F1	.854				

15 items CFA model of production competitiveness could not meet the requirement of good model fit i.e. (CMIN/DF=9.246, CFI=.833, GFI=.718, AGFI= .720, RMSEA=0.140 Sig @.000). After going through the correlated error approach, few parameters of fit indices reached an acceptable level, but the overall goodness of fit model was still not to an adequately acceptable level (CMIN/DF=3.246, CFI=.901, GFI=.835, AGFI= .871, RMSEA=0.090 Sig @.001). However, after removing seven items (Prod 1, Prod 2, Prod 4, Prod 6, Prod 13, Prod 14, Prod 15) with high covariance, low factor loadings (< 0.70) and poor reliability scores (< 0.50), the resulting goodness of fit statistics were CMIN/DF=2.263, CFI=.977, GFI=.953, AGFI= .915, and RMSEA=.075 insignificant with p-value of 0.07. The factor loading of retained items, as shown in Figure 5.4, was above the threshold level of 0.70 with a significant p-value (<0.001), establishing the convergent validity of the construct. Similarly, the SMC value of all items was above the threshold level of 0.50, which supported the reliability of variables.

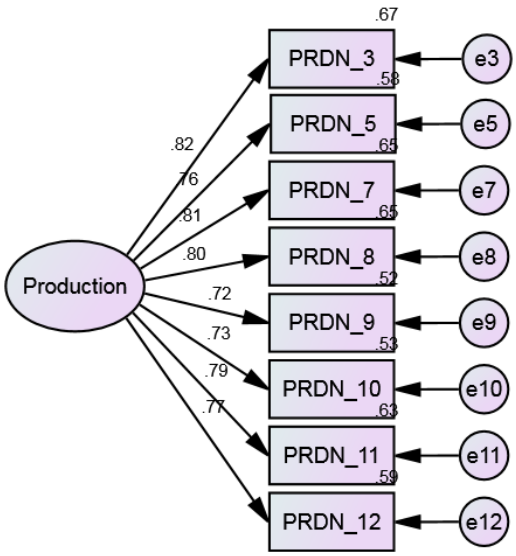


Figure 5.4: One-Factor Model for Production Competitiveness with Standardised Weights

Table 5.17 shows that the standardised regression weights of all the observed variables of production competitiveness construct were above the acceptable level of 0.5. Similarly, the t-value of all variables was above 1.96 (CR>1.96) with a significance level (<0.001) that established all the observed variables were significantly related to production competitiveness construct, thus confirming the convergent validity of the construct.

Table 5. 17: Regression Weights of the Production Competitiveness Construct

Regression Weights			Estimate	S.E.	C.R.	P	Label
Production_Competitive_3	<---	F1	1.000				
Production_Competitive_5	<---	F1	.976	.076	12.878	***	par_1
Production_Competitive_7	<---	F1	1.056	.076	13.927	***	par_2
Production_Competitive_8	<---	F1	1.123	.081	13.870	***	par_3
Production_Competitive_9	<---	F1	.974	.081	11.975	***	par_4
Production_Competitive_10	<---	F1	.992	.082	12.161	***	par_5
Production_Competitive_11	<---	F1	1.019	.075	13.543	***	par_6
Production_Competitive_12	<---	F1	1.003	.077	12.966	***	par_7

Standardized Regression Weights			Estimate
Production_Competitive_3	<---	F1	.819
Production_Competitive_5	<---	F1	.763
Production_Competitive_7	<---	F1	.806
Production_Competitive_8	<---	F1	.804
Production_Competitive_9	<---	F1	.723
Production_Competitive_10	<---	F1	.731
Production_Competitive_11	<---	F1	.791
Production_Competitive_12	<---	F1	.766

Seven items CFA model of internationalisation competitiveness is close to the requirement of good model fit i.e. (CMIN/DF=9.246, CFI=.923, GFI=.878, AGFI= .890, RMSEA=0.79 Sig @.025). However, after elimination of one poorly loaded item, the resulting goodness of fit statistics were CMIN/DF=2.139, CFI=.997, GFI=.980, AGFI=

.940, and RMSEA=.071 insignificant with p-value 0.240. The factor loading of retained items, as shown in Figure 5.5, was above the threshold level of 0.70 with a significant p-value (<0.001), establishing the convergent validity of the construct. Similarly, the SMC value of all items was above the threshold level of 0.50, which supported the reliability of variables.

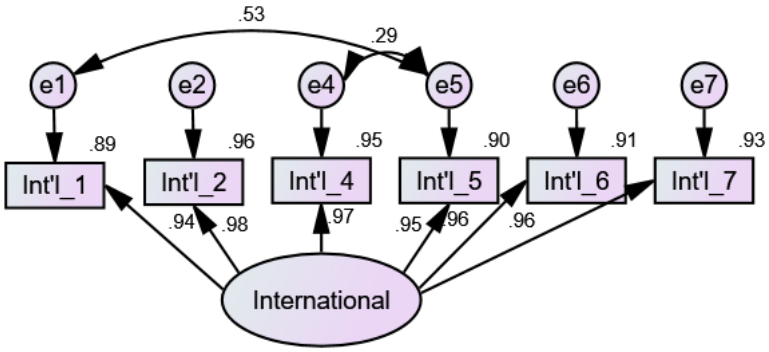


Figure 5.5: One-Factor Model for Internationalisation Competitiveness with Standardised Weights

Table 5.18 shows that the standardised regression weights of all the observed variables of the internationalisation competitiveness construct were above the acceptable level of 0.5. Similarly, the t-value of all variables was above 1.96 (CR>1.96) with a significance level (<0.001) that established all the observed variables were significantly related to internationalisation competitiveness construct, thus confirming the convergent validity of the construct.

Table 5.18: Regression Weights of the Internationalisation Competitiveness

Regression Weights			Estimate	S.E.	C.R.	P	Label
Intl_Competitive_1	<---	F1	1.000				
Intl_Competitive_2	<---	F1	1.012	.028	36.764	***	par_1
Intl_Competitive_4	<---	F1	.977	.028	35.151	***	par_2
Intl_Competitive_5	<---	F1	1.021	.023	45.084	***	par_3
Intl_Competitive_6	<---	F1	.989	.031	31.801	***	par_4
Intl_Competitive_7	<---	F1	1.044	.032	33.109	***	par_5

Standardized Regression Weights			Estimate
Intl_Competitive_1	<---	F1	.944
Intl_Competitive_2	<---	F1	.981
Intl_Competitive_4	<---	F1	.974
Intl_Competitive_5	<---	F1	.951
Intl_Competitive_6	<---	F1	.956
Intl_Competitive_7	<---	F1	.963

The CFA model of the market competitiveness seemed to fully meet the requirements of an adequate model fit parameter with CMIN/DF=2.508, CFI=.990, GFI=.971, AGFI= .933, and RMSEA=.069 insignificant with p-value 0.212. The factor loading of retained items, as shown in Figure 5.6, is above the threshold level of 0.70 with a significant p-value (<0.001), establishing the convergent validity of the construct. Similarly, the SMC value of all items was above the threshold level of 0.50, which supported the reliability of variables.

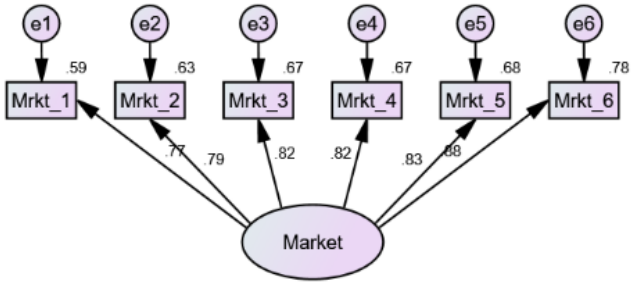


Figure 5.6: One-Factor Model for Market Competitiveness with Standardised Weights

Table 5.19 shows that the standardised regression weights of all the observed variables of market competitiveness construct were above the acceptable level of 0.5. Similarly, the t-value of all variables was above 1.96 (CR>1.96) with a significance level (<0.001), establishing that all the observed variables were significantly related to the market-based competitiveness construct, thus confirming the convergent validity of the construct.

Table 5.19: Regression Weights of the Internationalisation Competitiveness

Regression Weights			Estimate	S.E.	C.R.	P	Label
Market_Competitive_1	<---	F1	1.000				
Market_Competitive_2	<---	F1	.992	.079	12.508	***	par_1
Market_Competitive_3	<---	F1	1.012	.078	13.045	***	par_2
Market_Competitive_4	<---	F1	1.049	.081	13.009	***	par_3
Market_Competitive_5	<---	F1	1.122	.085	13.127	***	par_4
Market_Competitive_6	<---	F1	1.145	.081	14.225	***	par_5

Standardized Regression Weights			Estimate
Market_Competitive_1	<---	F1	.767
Market_Competitive_2	<---	F1	.793
Market_Competitive_3	<---	F1	.821
Market_Competitive_4	<---	F1	.819
Market_Competitive_5	<---	F1	.825
Market_Competitive_6	<---	F1	.883

In the end, a combined CFA model of all four dimensions of competitiveness was obtained. Although the competitiveness dimensions were considered individually in the hypotheses, it may be beneficial to investigate the impact of the use of the CFC program on the overall competitiveness of SMEs. Also, this combined CFA model may further establish the validity and reliability of the individually identified model. The model fit indices meet most of the goodness of fit model requirements quite adequately with CMIN/DF=1.370, CFI=.984, GFI=.892, AGFI= .866, and RMSEA=.041

insignificant with p-value 0.927. As shown in Figure 5.7, the factor loading of all items of respective factors was above the threshold level of 0.70 with a significant p-value (<0.001), establishing the convergent validity of the construct. Similarly, the SMC value of all items was above the threshold level of 0.50, which supported the reliability of variables. This validates that the overall combined model of all four dimensions is also adequate for necessary analysis.

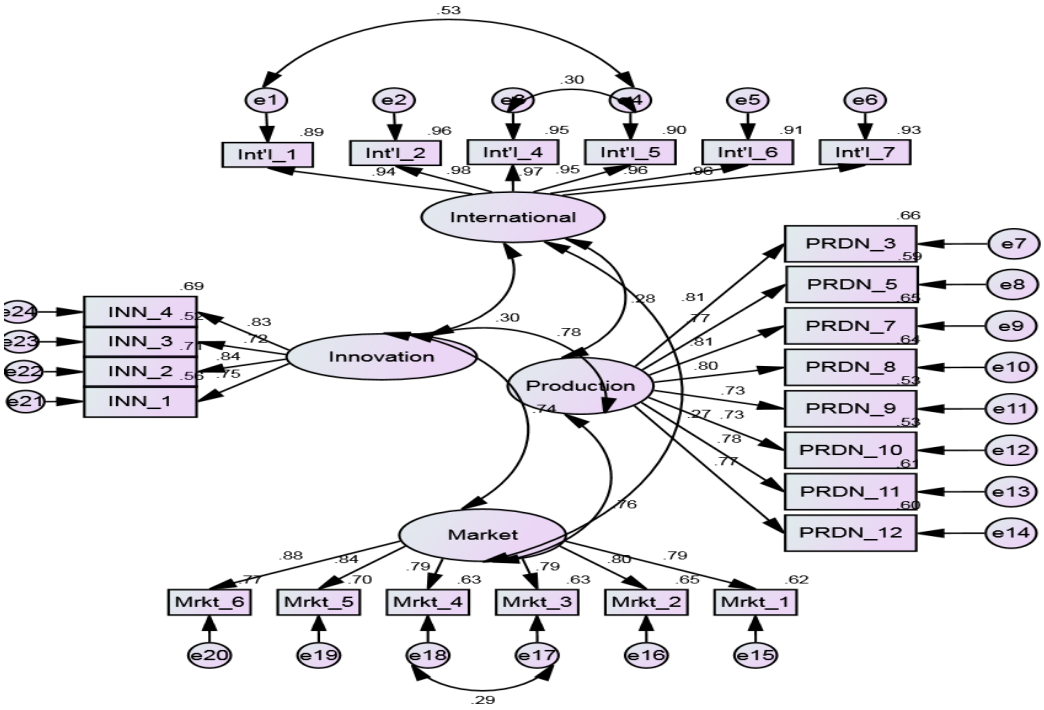


Figure 5.7: Combined Model of All Competitiveness Dimensions with Regression Weights

Table 5.20 shows that the standardised regression weights of all the observed variables of respective competitiveness dimensions were above the acceptable level of 0.5. Similarly, the t-value of all variables was above 1.96 (CR>1.96) with a significance level <0.001, which supports that all the stated dimensions and respective observed variables are significantly related to their respective competitiveness

construct, thus confirming the convergent validity of the combined construct of competitiveness.

Table 5.20: Regression Weights of All Four Competitiveness Dimensions

Regression Weights			Estimate	S.E.	C.R.	P	Label
Production_Competitive_3	<---	F2	1.000				
Production_Competitive_5	<---	F2	.991	.076	13.064	***	par_1
Production_Competitive_7	<---	F2	1.062	.076	13.936	***	par_2
Production_Competitive_8	<---	F2	1.127	.081	13.844	***	par_3
Production_Competitive_9	<---	F2	.990	.081	12.162	***	par_4
Production_Competitive_10	<---	F2	.994	.082	12.105	***	par_5
Production_Competitive_11	<---	F2	1.011	.076	13.307	***	par_6
Production_Competitive_12	<---	F2	1.018	.077	13.144	***	par_7
Innovation_Competitive_1	<---	F1	1.000				
Innovation_Competitive_2	<---	F1	1.070	.085	12.558	***	par_8
Innovation_Competitive_3	<---	F1	1.000	.094	10.660	***	par_9
Innovation_Competitive_4	<---	F1	1.039	.084	12.340	***	par_10
Intl_Competitive_1	<---	F3	1.000				
Intl_Competitive_2	<---	F3	1.013	.028	36.818	***	par_11
Intl_Competitive_4	<---	F3	.977	.028	35.140	***	par_12
Intl_Competitive_5	<---	F3	1.020	.023	45.082	***	par_13
Intl_Competitive_6	<---	F3	.988	.031	31.786	***	par_14
Intl_Competitive_7	<---	F3	1.044	.032	33.109	***	par_15
Market_Competitive_1	<---	F4	1.000				
Market_Competitive_2	<---	F4	.981	.075	13.141	***	par_18
Market_Competitive_3	<---	F4	.952	.074	12.856	***	par_19
Market_Competitive_4	<---	F4	.990	.077	12.856	***	par_20
Market_Competitive_5	<---	F4	1.109	.080	13.828	***	par_21
Market_Competitive_6	<---	F4	1.112	.075	14.736	***	par_22

Standardized Regression Weights			Estimate
Production_Competitive_3	<---	F2	.814
Production_Competitive_5	<---	F2	.770
Production_Competitive_7	<---	F2	.806
Production_Competitive_8	<---	F2	.803
Production_Competitive_9	<---	F2	.730
Production_Competitive_10	<---	F2	.728
Production_Competitive_11	<---	F2	.780
Production_Competitive_12	<---	F2	.773
Innovation_Competitive_1	<---	F1	.748
Innovation_Competitive_2	<---	F1	.844
Innovation_Competitive_3	<---	F1	.723
Innovation_Competitive_4	<---	F1	.829
Intl_Competitive_1	<---	F3	.944
Intl_Competitive_2	<---	F3	.981
Intl_Competitive_4	<---	F3	.973
Intl_Competitive_5	<---	F3	.951
Intl_Competitive_6	<---	F3	.956
Intl_Competitive_7	<---	F3	.963
Market_Competitive_1	<---	F4	.785
Market_Competitive_2	<---	F4	.803
Market_Competitive_3	<---	F4	.791
Market_Competitive_4	<---	F4	.791
Market_Competitive_5	<---	F4	.836
Market_Competitive_6	<---	F4	.878

5.7.2 Scale Reliability of Constructs

Composite reliability scores and average variance extracted (AVE) of all constructs were calculated. The construct reliability of all latent variables exceeded the acceptable level of 0.7 (see Table 5.21). The AVE values were also above the acceptable level of 0.5. These values confirmed that the finalised scales were highly reliable for data analysis.

Table 5.21: Scale Reliability of Constructs

Construct	Composite Reliability	Cronbach's Alpha	Average Variance Extracted (AVE)
Networking Capability	0.858	0.883	0.551
Absorptive Capacity	0.890	0.942	0.575
Innovation	0.867	0.863	0.620
Production	0.924	0.946	0.602
Internationalisation	0.987	0.989	0.924
Market Competitiveness	0.922	0.924	0.664

5.7.3 Summary of CFA

The factor structure of six measurement scales as explored by EFA were further analysed through CFA for the appropriateness of good model fit, reliability, and convergent validity. Most of the factor structure, as identified by EFA, could not meet the goodness of model fit requirement in CFA. Modification indices were used to covariate items to achieve model fit. Items with heavy covariance, low factor loadings, and poor reliability scores were removed from all measurement scales (except innovation competitiveness) to improve model fit parameters. Six measurement models for the six modified constructs adequately met the requirement of a good model fit along with satisfactory factor loadings and reliability estimates. In terms of the internal structure of the model, parameter estimates of all indicator variables were

well above the acceptable threshold level and significant. Convergent validity of all constructs was also evident as the factor loadings of all retained items were above the acceptable threshold level. On the whole, all indicators of uni-dimensionality, validity, and reliability confirmed the congeneric measurement model of all constructs. After the exploratory and confirmatory analysis and adjustment of construct items, a correlation matrix was calculated to address the nomological validity of the constructs. This was an attempt to ensure that all the main variables of the framework related with each other in a theoretically predicted way. The correlation matrix, as shown in Table 5.22, provides support for the nomological validity as almost all important variables (except internationalisation) correlated with each other with acceptable weights and predicted direction.

Table 5.22: Correlation Matrix between the Constructs, Means and Standard Deviation

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1- Firm Age	4.33	1.03		-.007	-.237**	.053	-.028	.060	.058	.104	.069	-.084	.067	-.013
2- Firm Size	1.94	.79	-.007		-.120	-.096	-.276**	-.037	.067	.142*	.063	.168*	.033	-.162*
3- Use of other Program	1.78	.41	-.237**	-.120		.146*	.145*	-.073	-.110	-.105	-.119	-.184**	-.141*	-.004
4- Use of Financial Grant	1.86	.34	.053	-.096	.146*		.011	.106	.103	-.028	.030	-.100	.046	.106
5- Export	1.51	.50	-.028	-.276**	.145*	.011		-.074	-.169*	-.164*	-.127	-.552**	-.131*	-.067
6- Networking Capability	21.59	4.80	.060	-.037	-.073	.106	-.074		.420**	.303**	.495**	.062	.458**	.287**
7- Absorptive Capacity	32.33	6.02	.058	.067	-.110	.103	-.169*	.420**		.662**	.698**	.153*	.608**	.189**
8- Innovation	21.01	4.07	.104	.142*	-.105	-.028	-.164*	.303**	.662**		.707**	.268**	.655**	.175**
9- Production	41.87	7.66	.069	.063	-.119	.030	-.127	.495**	.698**	.707**		.266**	.700**	.241**
10- Internationalisation	19.86	14.15	-.084	.168*	-.184**	-.100	-.552**	.062	.153*	.268**	.266**		.245**	-.006
11- Market	30.78	6.14	.067	.033	-.141*	.046	-.131*	.458**	.608**	.655**	.700**	.245**		.277**
12- Use of CFC	16.92	10.79	-.013	-.162*	-.004	.106	-.067	.287**	.189**	.175**	.241**	-.006	.277**	

**. Correlation is significant at the 0.01 level (2-tailed).

5.8 HYPOTHESES TESTING: STRUCTURAL EQUATION MODELLING

The main hypotheses of this research was tested using SEM in AMOS by adopting the maximum likelihood assessment approach. Path analysis was performed to investigate the hypothesised relationship between the use of the CFC program and different facets of firm competitiveness, and to investigate the moderating effect of ACAP and NCAP on this relationship. In SEM, path analysis uses bivariate correlations to estimate the direct and indirect strength of the structural relationship in a path diagram (Hair et al. 2010). SEM provides researchers with the flexibility to add, remove, or/and modify paths to obtain adequate fit parameters. Modification indices are mostly used to modify paths; however, researchers suggest that the decision to modify the model path must be theoretically justified (Hair et al. 2010; Kline 2010).

The first hypothesis of this research states that the use of the CFC program may have a significant and positive effect on the competitiveness of the user firm. Firm competitiveness's construct consists of four separate dimensions: 1) innovation competitiveness, 2) production competitiveness, 3) internationalisation competitiveness, and 4) market competitiveness. Therefore, the impact of the use of CFC program was tested separately on all four dimensions.

The use of the CFC program consists of six services that most sampled firms had used during the past three to five years. The original survey instrument included nine distinct services; however, the objective and subjective responses in the final round of data collection revealed that mostly CFCs were not offering all the services and thus the selected six services were available in almost all CFCs. The six services included: 1) production of parts and/or products in CFC, 2) laboratory facility, 3) prototyping and parts development, 4) technical training, 5) technical consultancy, and 6) seminars/events about new technologies, production systems, products, markets etc.

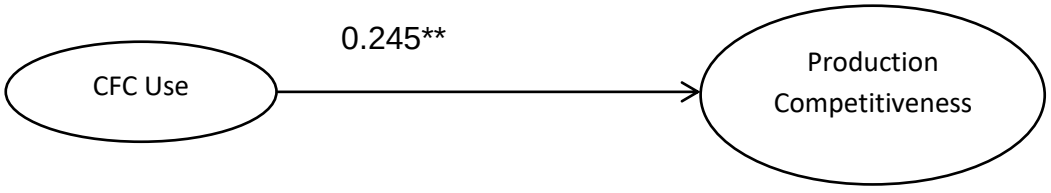
In the structural model, the 'CFC Use' variable is calculated as the centred composite variable. An attempt was made to test the 'CFC Usage' variable as a latent variable; however, poor model fit and severe multi-collinearity made it more appropriate to use CFC usage as a centred composite variable. In model testing, the comparison was also made by placing the 'CFC Use' variable as a latent variable and then a centred composite variable. The centred composite variable produced highly adequate model fit indices as compared to poor model fit indices as a latent variable. The similar centred composite approach has been used by leading previous scholars (see Fernet, Gagné & Austin 2010; Sisodiya, Johnson & Grégoire 2013; Song et al. 2005).

5.8.1. The Use of CFC Program and Production Competitiveness (H1a)

The first hypothesis relates the positive effect of CFC program use on the competitiveness of user SME. Part A of this hypothesis specifically states that:

H-1a - the use of the CFC program will have a statistically significant positive effect on firm's production competitiveness.

This hypothesis is tested through a path model shown in Figure 5.8.



** Significant @ .001

Figure 5.8: Path Diagram of CFC Usage's Effect on Production Competitiveness

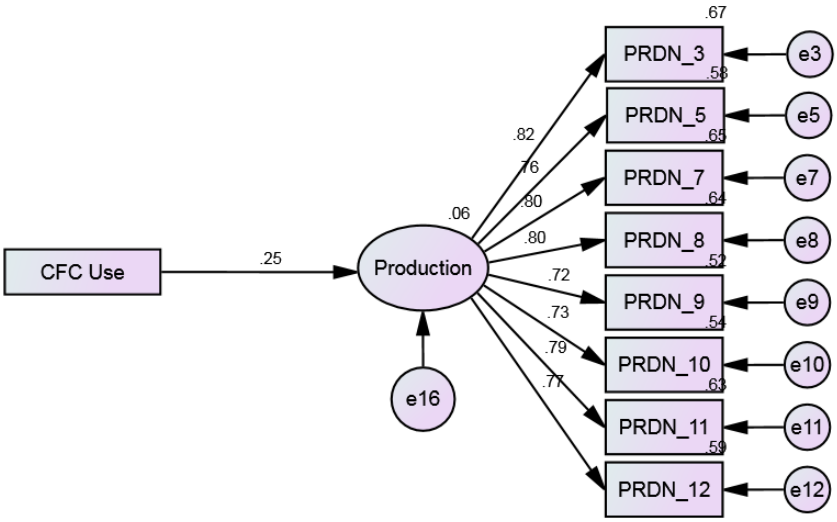


Figure 5.9: Standardised Weights of CFC Use and Production Competitiveness Model

According to standardised regression weights given in Figure 5.9, the use of the CFC program is positively associated with the production competitiveness of user SMEs. The satisfactory goodness of fit indices (CMIN/*df.* =1.909, CFI=.978, GFI=.953, AGFI=.921, RMSEA=.064 and PCLOSE=.181) show that the investigated model fits well with the data and thus, it is appropriate to analyse and draw inferences.

Table 5.23 shows the regression weight, standardised regression weights, CR value and significance level of the relationship between variables of interest in the model. According to standardised regression weight, the use of the CFC program explains 24.5% of the variance in production competitiveness of user SMEs. The CR value is above the threshold value of 1.96 and significant at the p-value 0.001 level, which shows that the relationship is statistically significant and positive, therefore confirming the hypothesis that the use of CFC program influences positively the production competitiveness of user SMEs.

Table 5.23: Regression Weights of the Effect of CFC Use on Production Competitiveness

Regression Weights			Estimate	S.E.	C.R.	P	Label
F1 (Production Competitiveness)	<---	Use	.021	.006	3.578	***	par_8
Production_Competitive_3	<---	F1	1.000				
Production_Competitive_5	<---	F1	.977	.076	12.902	***	par_1
Production_Competitive_7	<---	F1	1.054	.076	13.897	***	par_2
Production_Competitive_8	<---	F1	1.121	.081	13.845	***	par_3
Production_Competitive_9	<---	F1	.976	.081	12.015	***	par_4
Production_Competitive_10	<---	F1	.993	.082	12.179	***	par_5
Production_Competitive_11	<---	F1	1.020	.075	13.569	***	par_6
Production_Competitive_12	<---	F1	1.002	.077	12.965	***	par_7

Standardized Regression Weights			Estimate
F1 (Production Competitiveness)	<---	Use	.245
Production_Competitive_3	<---	F1	.819
Production_Competitive_5	<---	F1	.763
Production_Competitive_7	<---	F1	.805
Production_Competitive_8	<---	F1	.803
Production_Competitive_9	<---	F1	.724
Production_Competitive_10	<---	F1	.732
Production_Competitive_11	<---	F1	.792
Production_Competitive_12	<---	F1	.766

5.8.2 The Use of CFC Program and Innovation Competitiveness (H1b)

Part B of the first hypothesis specifically states that

H-1b - the use of the CFC program will have a statistically significant positive effect on the firm's innovation competitiveness.

This hypothesis is tested through a path model shown in Figure 5.10.

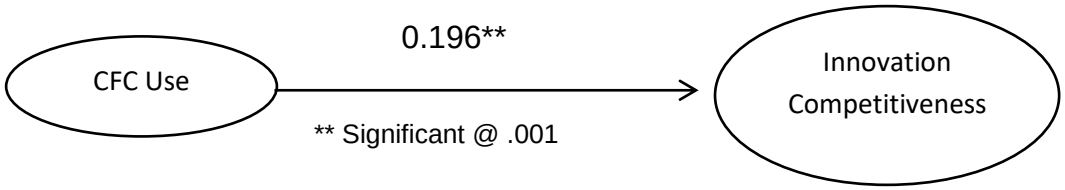


Figure 5.10: Path Diagram of CFC Usage's Effect on Innovation Competitiveness

According to standardised regression weights given in Figures 5.10 and 5.11, the use of the CFC program positively influences the innovation competitiveness of user SMEs. The satisfactory goodness of fit indices (CMIN/df=1.542, CFI=.994, GFI=.987, AGFI=.961, RMSEA=.047 and PCLOSE=.433) show that the investigated model fits well with the data and thus it is appropriate to analyse and draw inferences.

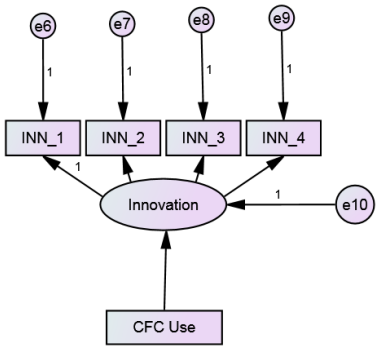


Figure 5.11: Standardised Weights of CFC Use and Innovation Competitiveness model

Table 5.24 shows the regression weight, standardised regression weights, CR value and significance level of the relationship between variables of interest in the model. According to standardised regression weight, the use of CFC program explains 19.6% of the variance in innovation competitiveness of user SMEs. The CR value is above the threshold value of 1.96 and significant at 0.001 level, which shows that the relationship is significant, therefore confirming the hypothesis that the use of CFC program influences positively the innovation competitiveness of user SMEs.

Table 5.24: Regression Weights of the Effect of CFC Use on Innovation Competitiveness

Regression Weights			Estimate	S.E.	C.R.	P	Label
F2 (Innovation Competitiveness)	<---	Use	.017	.006	2.745	.001	par_4
Innovation_Competitive_1	<---	F2	1.000				
Innovation_Competitive_2	<---	F2	1.050	.088	11.881	***	par_1
Innovation_Competitive_3	<---	F2	.995	.096	10.338	***	par_2
Innovation_Competitive_4	<---	F2	1.069	.088	12.144	***	par_3

Standardized Regression Weights			Estimate
F2 (Innovation Competitiveness)	<---	Use	.196
Innovation_Competitive_1	<---	F2	.747
Innovation_Competitive_2	<---	F2	.827
Innovation_Competitive_3	<---	F2	.718
Innovation_Competitive_4	<---	F2	.852

5.8.3 The Use of CFC Program and Internationalisation Competitiveness (H1c)

Part C of the first hypothesis specifically states that:

H-1c - the use of CFC program will have a significant positive effect on firm's Internationalisation Competitiveness. This hypothesis is tested through a path model shown in Figure 5.12.

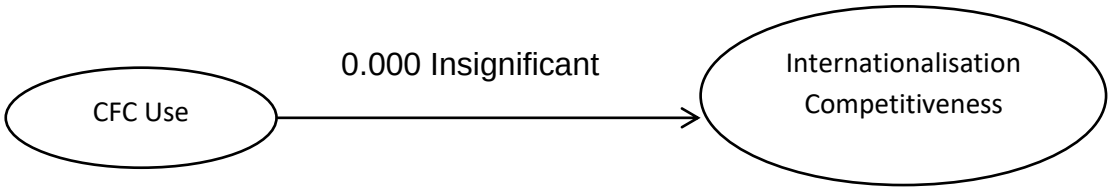


Figure 5.12: Path Diagram of CFC Usage's Effect on Internationalisation Competitiveness

According to standardised regression weights given in Figures 5.12 and 5.13, the use of the CFC program does not significantly influence the internationalisation competitiveness of the user SME. The satisfactory goodness of fit indices (CMIN/df=1.751, CFI=.997, GFI=.975, AGFI=.942, RMSEA=.058 and PCLOSE=.333) show that the investigated model fits well with the data and thus, it is appropriate to analyse and draw inferences.

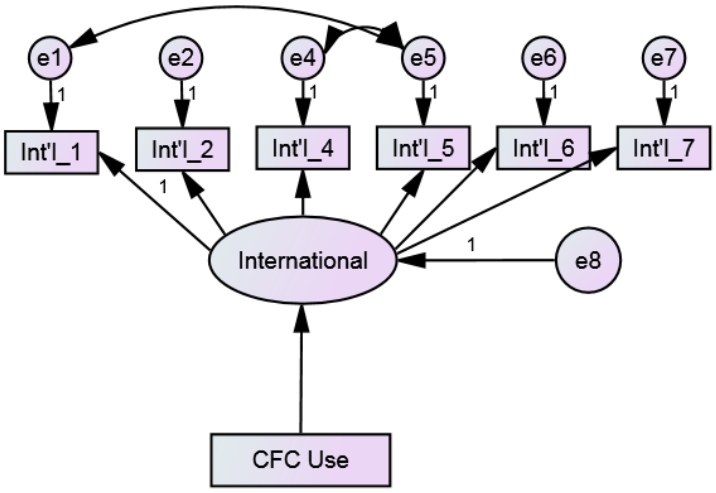


Figure 5.13: Standardised Weights of CFC Use and Internationalisation Competitiveness model

Table 5.25 shows the regression weight, standardised regression weights, CR value and significance level of the relationship between variables of interest in the model. According to the standardised regression weight, the use of CFC program explains 0% of the variance in the internationalisation competitiveness of user SMEs. The CR value is far less than the threshold value of 1.96 and is not significant, which shows that the relationship is non-significant, therefore, does not confirm the hypothesis that the use of CFC program influences positively the internationalisation competitiveness of user SMEs.

Table 5.25: Regression Weights of the Effect of CFC Use on Internationalisation Competitiveness

Regression Weights			Estimate	S.E.	C.R.	P	Label
F1	<---	Use	.000	.015	.004	.997	par_8
Intl_Competitive_1	<---	F1	1.000				
Intl_Competitive_2	<---	F1	1.012	.028	36.764	***	par_1
Intl_Competitive_4	<---	F1	.977	.028	35.151	***	par_2
Intl_Competitive_5	<---	F1	1.021	.023	45.084	***	par_3
Intl_Competitive_6	<---	F1	.989	.031	31.801	***	par_4
Intl_Competitive_7	<---	F1	1.044	.032	33.109	***	par_5

Standardized Regression Weights			Estimate
F1	<---	Use	.000
Intl_Competitive_1	<---	F1	.944
Intl_Competitive_2	<---	F1	.981
Intl_Competitive_4	<---	F1	.974
Intl_Competitive_5	<---	F1	.951
Intl_Competitive_6	<---	F1	.956
Intl_Competitive_7	<---	F1	.963

5.8.4 The Use of CFC Program and Market Competitiveness (H1d)

Part D of the first hypothesis specifically states that:

H-1d - the use of CFC program will have a significant positive effect on the firm's Market Competitiveness.

This hypothesis is tested through a path model shown in Figure 5.14.

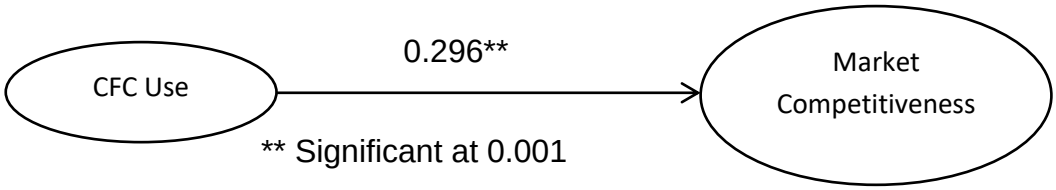


Figure 5.14: Path Diagram of CFC Usage's Effect on Market Competitiveness

According to standardised regression weights given in Figures 5.14 and 5.15, the use of the CFC program significantly and positively influences the internationalisation competitiveness of user SMEs. The satisfactory goodness of fit indices (CMIN/df=2.710, CFI=.983, GFI=.962, AGFI=.924, RMSEA=.072 and PCLOSE=.134) show that the investigated model fits well with the data and thus it is appropriate to analyse and draw inferences.

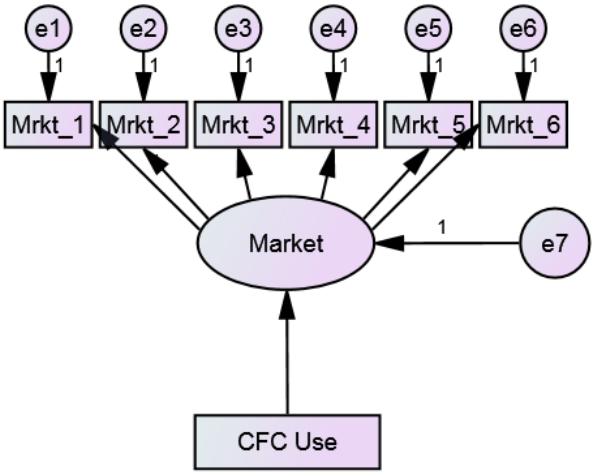


Figure 5.15: CFC Use and Market Competitiveness model

Table 5.26 shows the regression weight, standardised regression weights, CR value and significance level of the relationship between variables of interest in the model. According to standardised regression weight, the use of CFC program explains 29.6% of the variance in the market-based competitiveness of user SMEs. The CR value is above the threshold value of 1.96 and significant at 0.001 level, which shows that the relationship is significant, therefore confirming the hypothesis that the use of CFC program influences positively the market competitiveness of user SMEs.

Table 5.26: Regression Weights of the Effect of CFC Use on Market Competitiveness

Regression Weights			Estimate	S.E.	C.R.	P	Label
F1 (Market Competitiveness)	<---	Use	.026	.006	4.317	***	par_6
Market_Competitive_1	<---	F1	1.000				
Market_Competitive_2	<---	F1	.998	.080	12.515	***	par_1
Market_Competitive_3	<---	F1	1.013	.078	12.970	***	par_2
Market_Competitive_4	<---	F1	1.050	.081	12.931	***	par_3
Market_Competitive_5	<---	F1	1.124	.086	13.069	***	par_4
Market_Competitive_6	<---	F1	1.152	.081	14.208	***	par_5

Standardized Regression Weights			Estimate
F1 (Market Competitiveness)	<---	Use	.296
Market_Competitive_1	<---	F1	.764
Market_Competitive_2	<---	F1	.795
Market_Competitive_3	<---	F1	.819
Market_Competitive_4	<---	F1	.817
Market_Competitive_5	<---	F1	.825
Market_Competitive_6	<---	F1	.885

5.9 MODERATING ROLE OF ABSORPTIVE CAPACITY (H2)

The second hypothesis is related to the moderating effect of ACAP on the relationship between CFC Program Use and SME competitiveness. In this regard, the second hypothesis was broken down into four sub-hypotheses.

5.9.1 Moderating Role of Absorptive Capacity on the Relationship between CFC Program Use and Production Competitiveness (H2a)

Part A of the second hypothesis (H-2b) states that the ACAP of firms will moderate the effect of the use of the CFC program on their production competitiveness. This hypothesis was tested through the path model by creating an interaction term, as

shown in Figure 5.16 between the independent (CFC Usage) and moderating variable (ACAP).

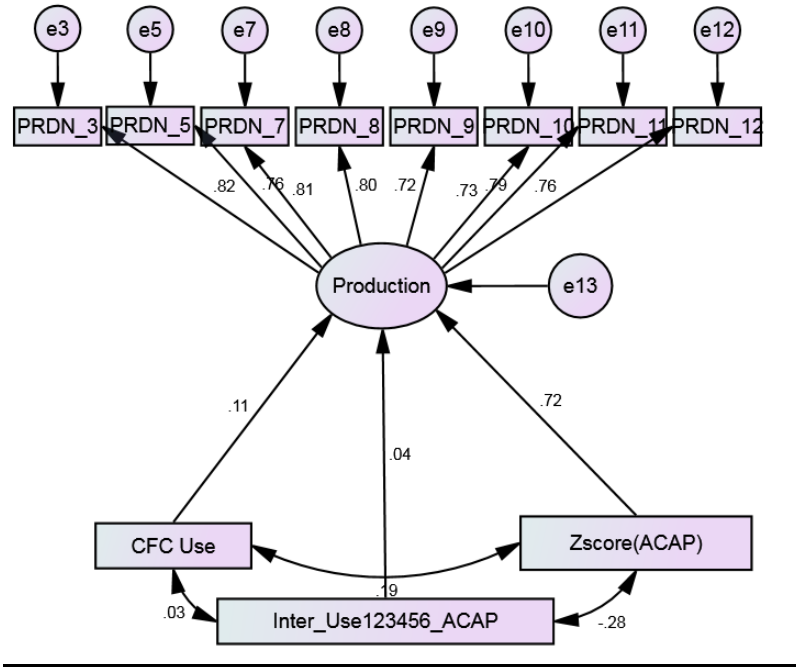


Figure 5.16: Standardised Weights of Interaction of CFC Use and Absorptive Capacity with Production Competitiveness model

The outcome model meets the accepted parameters of adequate model fit (CMIN/df=1.499, CFI=.979, GFI=.950, AGFI=.919, RMSEA=.054 and PCLOSE=.375). However, the standardised regression weights and significance level, given in Table 5.27, showed that there was no significant moderating effect of ACAP of the user SME on the effect of CFC program use on its production competitiveness. However, ACAP individually had a positive and significant direct effect on the production competitiveness of user firms.

Table 5.27: Regression Weights of SEM Model of the Interactional Effect of CFC Use and Absorptive Capacity on Production Competitiveness

Regression Weights			Estimate	S.E.	C.R.	P	Label
F1	<---	Use	.009	.004	2.135	.033	par_11
F1	<---	ZACAP_6_Items	.650	.056	11.681	***	par_12
F1	<---	Inter_Use_ACAP	.039	.048	.814	.415	par_13
Production_Competitive_3	<---	F1	1.000				
Production_Competitive_5	<---	F1	.978	.075	12.988	***	par_4
Production_Competitive_7	<---	F1	1.063	.075	14.148	***	par_5
Production_Competitive_8	<---	F1	1.120	.081	13.903	***	par_6
Production_Competitive_9	<---	F1	.976	.081	12.079	***	par_7
Production_Competitive_10	<---	F1	.993	.081	12.238	***	par_8
Production_Competitive_11	<---	F1	1.016	.075	13.566	***	par_9
Production_Competitive_12	<---	F1	.997	.077	12.933	***	par_10
Standardized Regression Weights			**Estimate**				
F1	<---	Use	.108				
F1	<---	ZACAP_6_Items	.718				
F1	<---	Inter_Use_ACAP	.042				
Production_Competitive_3	<---	F1	.819				
Production_Competitive_5	<---	F1	.764				
Production_Competitive_7	<---	F1	.812				
Production_Competitive_8	<---	F1	.802				
Production_Competitive_9	<---	F1	.724				
Production_Competitive_10	<---	F1	.731				
Production_Competitive_11	<---	F1	.788				
Production_Competitive_12	<---	F1	.762				

5.9.2 Moderating Role of Absorptive Capacity on the Relationship between CFC Program Use and Innovation Competitiveness (H2b)

Part B of the second hypothesis (H-2b) states that the ACAP of firms will moderate the effect of the use of the CFC program on their Innovation Competitiveness. This hypothesis was tested through the path model, as shown in Figure 5.17, by creating

an interaction term between the independent (CFC Usage) and moderating variable (ACAP).

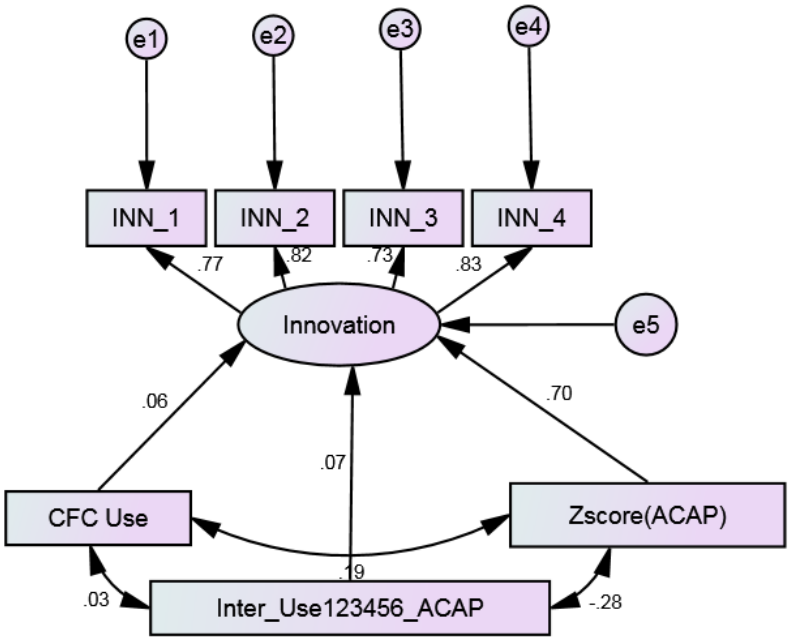


Figure 5.17: Standardised Weights of Interaction of CFC Use and Absorptive Capacity with Innovation Competitiveness model

The outcome model met the accepted parameters of adequate model fit (CMIN/df=2.499, CFI=.972, GFI=.969, AGFI=.920, RMSEA=.082 and PCLOSE=.072.) However, as shown in Table 5.28, the standardised regression weights and significance level showed that there is no significant moderating effect of ACAP of user SMEs on the effect of CFC program use on their innovation competitiveness. However, ACAP individually had a positive and significant direct effect on the innovation competitiveness of user firms.

Table 5.28: Regression Weights of SEM Model of the Interactional Effect of CFC Use and Absorptive Capacity on Innovation Competitiveness

Regression Weights			Estimate	S.E.	C.R.	P	Label
F1	<---	Use	.005	.005	1.068	.285	par_4
F1	<---	ZACAP_6_Items	.665	.065	10.149	***	par_5
F1	<---	Inter_Use_ACAP	.070	.055	1.260	.208	par_9
Innovation_Competitive_1	<---	F1	1.000				
Innovation_Competitive_2	<---	F1	1.018	.082	12.368	***	par_1
Innovation_Competitive_3	<---	F1	.990	.091	10.908	***	par_2
Innovation_Competitive_4	<---	F1	1.021	.081	12.547	***	par_3

Standardized Regression Weights			Estimate
F1	<---	Use	.059
F1	<---	ZACAP_6_Items	.705
F1	<---	Inter_Use_ACAP	.071
Innovation_Competitive_1	<---	F1	.765
Innovation_Competitive_2	<---	F1	.821
Innovation_Competitive_3	<---	F1	.731
Innovation_Competitive_4	<---	F1	.833

5.9.3 Moderating Role of Absorptive Capacity on the Relationship Between CFC Program Use and Internationalisation Competitiveness (H2c)

Part C of the second hypothesis (H-2c) states that the ACAP of firms will moderate the effect of the use of the CFC program on their Internationalisation Competitiveness. This hypothesis was tested through the path model, as shown in Figure 5.18, by creating an interaction term between the independent (CFC Usage) and moderating variable (ACAP).

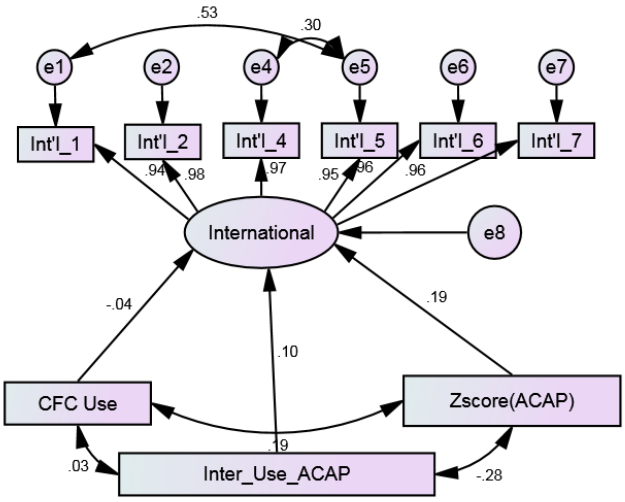


Figure 5.18: Standardised Weights of Interaction of CFC Use and Absorptive Capacity with Internationalisation Competitiveness Model

The outcome model fit met the accepted parameters of adequate model fit (CMIN/df=1.957, CFI=.992, GFI=.960, AGFI=.918, RMSEA=.066 and PCLOSE=.175). However, as shown in Table 5.29, the standardised regression weight and significance level show that there is no significant moderating effect of ACAP of the user SME on the effect of CFC program use on its Internationalisation competitiveness. However, ACAP individually has a positive and significant direct effect on the Internationalisation competitiveness of user firms.

Table 5.29: Regression Weights of SEM Model of the Interactional Effect of CFC Use and Absorptive Capacity on Internationalisation Competitiveness

Regression Weights			Estimate	S.E.	C.R.	P	Label
F1	<---	Use	-.008	.015	-.572	.567	par_11
F1	<---	ZACAP_6_Items	.447	.164	2.724	.006	par_12
F1	<---	Inter_Use_ACAP	.231	.167	1.383	.167	par_13
Intl_Competitive_1	<---	F1	1.000				
Intl_Competitive_2	<---	F1	1.013	.027	36.826	***	par_4
Intl_Competitive_4	<---	F1	.977	.028	35.143	***	par_5
Intl_Competitive_5	<---	F1	1.020	.023	45.084	***	par_6
Intl_Competitive_6	<---	F1	.989	.031	31.804	***	par_7
Intl_Competitive_7	<---	F1	1.044	.032	33.119	***	par_8

Standardized Regression Weights			Estimate
F1	<---	Use	-.039
F1	<---	ZACAP_6_Items	.192
F1	<---	Inter_Use_ACAP	.096
Intl_Competitive_1	<---	F1	.944
Intl_Competitive_2	<---	F1	.981
Intl_Competitive_4	<---	F1	.973
Intl_Competitive_5	<---	F1	.951
Intl_Competitive_6	<---	F1	.956
Intl_Competitive_7	<---	F1	.963

5.9.4 Moderating Role of Absorptive Capacity on the Relationship Between CFC Program Use and Market Competitiveness (H2d)

Part D of the second hypothesis (H-2d) states that the ACAP of firms will moderate the effect of the use of the CFC program on their market competitiveness. This hypothesis was tested through the path model, as given in Figure 5.19, by creating an interaction term between the independent (CFC Usage) and moderating variable (ACAP).

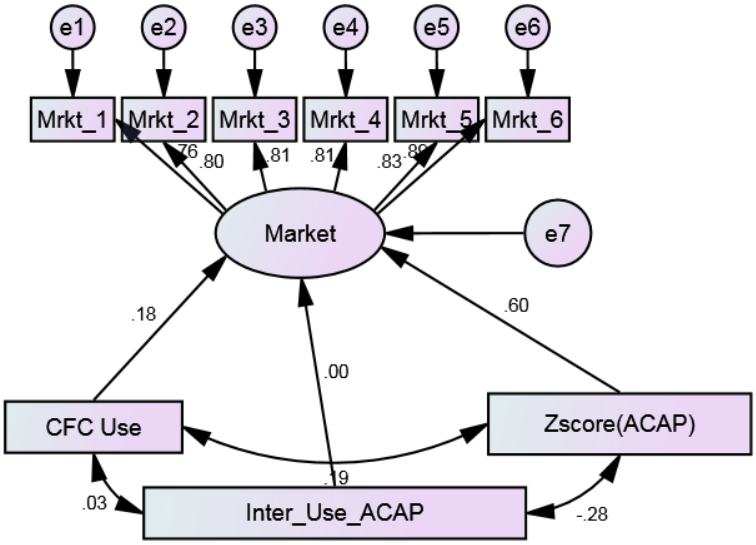


Figure 5.19: Standardised Weights of Interaction of CFC Use and Absorptive Capacity with Market Competitiveness model

The outcome model fit met the accepted parameters of adequate model fit (CMIN/df=2.050, CFI=.977, GFI=.953, AGFI=.912, RMSEA=.069 and PCLOSE=.124). However, the standardised regression weight and significance level, as given in Table 5.30, show that there was no significant moderating effect of ACAP of the user SME on the effect of CFC program use on its market competitiveness. However, ACAP individually has a positive and significant direct effect on the market competitiveness of user firms.

Table 5.30: Regression Weights of SEM Model of Interactional effect of CFC Use and Absorptive Capacity on Internationalisation Competitiveness

Regression Weights			Estimate	S.E.	C.R.	P	Label
F1	<---	Use	.016	.005	3.303	***	par_9
F1	<---	ZACAP_6_Items	.560	.062	9.099	***	par_10
F1	<---	Inter_Use_ACAP	-.005	.054	-.085	.932	par_11
Market_Competitive_1	<---	F1	1.000				
Market_Competitive_2	<---	F1	1.004	.080	12.603	***	par_4
Market_Competitive_3	<---	F1	1.002	.078	12.803	***	par_5
Market_Competitive_4	<---	F1	1.042	.081	12.806	***	par_6
Market_Competitive_5	<---	F1	1.138	.086	13.244	***	par_7
Market_Competitive_6	<---	F1	1.158	.081	14.296	***	par_8

Standardized Regression Weights			Estimate
F1	<---	Use	.184
F1	<---	ZACAP_6_Items	.602
F1	<---	Inter_Use_ACAP	-.005
Market_Competitive_1	<---	F1	.763
Market_Competitive_2	<---	F1	.799
Market_Competitive_3	<---	F1	.810
Market_Competitive_4	<---	F1	.810
Market_Competitive_5	<---	F1	.833
Market_Competitive_6	<---	F1	.888

5.10 MODERATING ROLE OF NETWORKING CAPABILITY

The third hypothesis is related to the moderating effect of NCAP on the relationship between CFC program use and SME competitiveness dimensions.

5.10.1 Moderating Role of Networking Capability on the Relationship between CFC Program Use and Production Competitiveness (H3a)

Part A of the third hypothesis (H-3a) stated that the NCAP of firms will moderate the effect of the use of the CFC program on their production competitiveness. This

hypothesis was tested through the path model by creating an interaction term between the independent (CFC Usage) and moderating variable (NCAP).

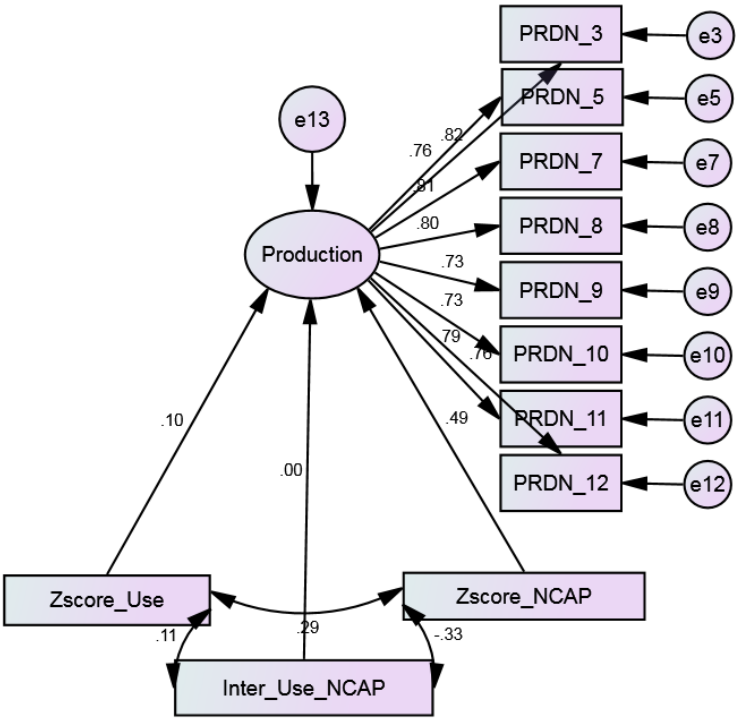


Figure 5.20: Standardised Weights of Interaction of CFC Use and Networking Capability with Production Competitiveness model

The outcome model met most of the accepted parameters of adequate model fit with CMIN/df=2.117, CFI=.963, GFI=.935, AGFI=.895, RMSEA=.071 and PCLOSE=.050. However, the standardised regression weight and significance level, given in Table 5.31, showed that there was no significant moderating effect of NCAP of the user SME on the effect of CFC program use on its production competitiveness. NCAP individually had a positive and significant direct effect on the production competitiveness of user firms.

Table 5.31: Regression Weights of SEM Model of the Interactional Effect of CFC Use and Networking Capability on Production Competitiveness

Regression Weights			Estimate	S.E.	C.R.	P	Label
F1	<---	ZUse	.095	.059	1.628	.103	par_8
F1	<---	Inter_Use_NCAP	.003	.065	.046	.964	par_9
F1	<---	ZNCAP	.447	.065	6.920	***	par_10
Production_Competitive_3	<---	F1	1.000				
Production_Competitive_5	<---	F1	.971	.074	13.068	***	par_1
Production_Competitive_7	<---	F1	1.051	.074	14.161	***	par_2
Production_Competitive_8	<---	F1	1.103	.080	13.844	***	par_3
Production_Competitive_9	<---	F1	.974	.080	12.229	***	par_4
Production_Competitive_10	<---	F1	.984	.080	12.275	***	par_5
Production_Competitive_11	<---	F1	1.013	.074	13.753	***	par_6
Production_Competitive_12	<---	F1	.981	.076	12.854	***	par_7

Standardized Regression Weights			Estimate
F1	<---	ZUse	.105
F1	<---	Inter_Use_NCAP	.003
F1	<---	ZNCAP	.490
Production_Competitive_3	<---	F1	.825
Production_Competitive_5	<---	F1	.765
Production_Competitive_7	<---	F1	.809
Production_Competitive_8	<---	F1	.796
Production_Competitive_9	<---	F1	.729
Production_Competitive_10	<---	F1	.731
Production_Competitive_11	<---	F1	.792
Production_Competitive_12	<---	F1	.756

5.10.2 Moderating Role of Networking Capability on the Relationship between CFC Program Use and Innovation Competitiveness (H3b)

Part B of the third hypothesis (H-3b) states that the NCAP of firms will moderate the effect of the use of the CFC program on their innovation competitiveness. This hypothesis was tested through the path model, as shown in Figure 5.21, by creating

an interaction term between the independent (CFC Usage) and moderating variable (NCAP).

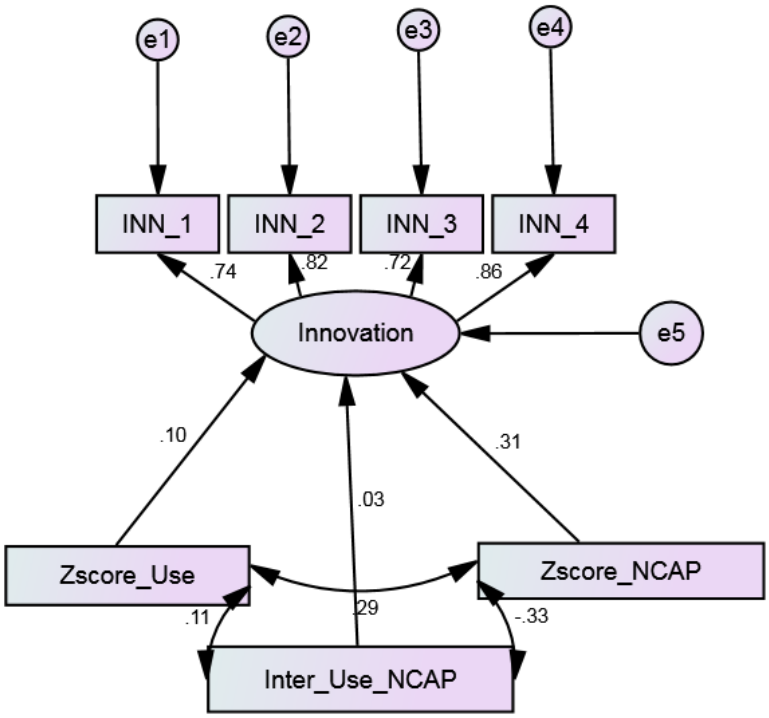


Figure 5.21: Standardised Weights of Interaction of CFC Use and Networking Capability with Innovation Competitiveness model

The outcome model met the accepted parameters of adequate model fit with CMIN/df=1.703, CFI=.985, GFI=.977, AGFI=.941, RMSEA=.056 and PCLOSE=.363. However, as shown in Table 5.32, the standardised regression weight and significance level showed that there is no significant moderating effect of the NCAP of the user SME on the effect of CFC program use on its innovation competitiveness. However, NCAP individually had a positive and significant direct effect on the innovation competitiveness of user firms.

Table 5.32: Regression Weights of SEM Model of the Interactional Effect of CFC Use and Networking Capability on Innovation Competitiveness

Regression Weights			Estimat	S.E.	C.R.	P	Labe
F1	<--	ZUse	.093	.06	1.402	.16	par_7
F1	<--	Inter_Use_NCA	.035	.07	.474	.63	par_8
F1	<--	ZNCAP	.285	.07	3.970	***	par_9
Innovation_Competitive_	<--	F1	1.000				
Innovation_Competitive_	<--	F1	1.050	.08	11.79	***	par_4
Innovation_Competitive_	<--	F1	1.004	.09	10.35	***	par_5
Innovation_Competitive_	<--	F1	1.081	.08	12.15	***	par_6

Standardized Regression Weights			Estimat
F1	<--	ZUse	.102
F1	<--	Inter_Use_NCA	.035
F1	<--	ZNCAP	.312
Innovation_Competitive_	<--	F1	.743
Innovation_Competitive_	<--	F1	.823
Innovation_Competitive_	<--	F1	.721
Innovation_Competitive_	<--	F1	.856

5.10.3 Moderating Role of Networking Capability on the Relationship between CFC Program Use and Internationalisation Competitiveness (H3c)

Part C of the third hypothesis (H-3c) states that the NCAP of firms will moderate the effect of the use of the CFC program on their internationalisation competitiveness. This hypothesis was tested through the path model, as shown in Figure 5.22, by creating an interaction term between the independent (CFC Usage) and moderating variable (NCAP).

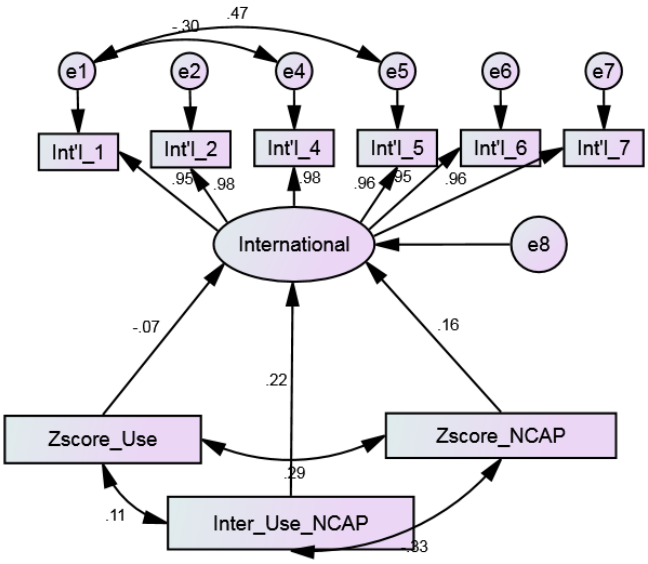


Figure 5.22: Standardised Weights of Interaction of CFC Use and Networking Capability with Internationalisation Competitiveness model

The outcome model fit met the accepted parameters of adequate model fit with CMIN/df=1.298, CFI=.998, GFI=.974, AGFI=.948, RMSEA=.037 and PCLOSE=.704. The standardised regression weight and significance level, as given in Table 5.33, showed that there was a significant moderating effect of the NCAP of the user SME on the effect of CFC program use on its internationalisation competitiveness. NCAP also individually had a positive and significant direct effect on the internationalisation competitiveness of user firms.

Table 5.33: Regression Weights of SEM Model of the Interactional Effect of CFC Use and Networking Capability on Internationalisation Competitiveness

Regression Weights			Estimate	S.E.	C.R.	P	Label
F1	<---	ZUse	-.170	.165	-1.034	.301	par_9
F1	<---	Inter_Use_NCAP	.555	.183	3.029	.002	par_10
F1	<---	ZNCAP	.370	.173	2.132	.033	par_11
Intl_Competitive_1	<---	F1	1.000				
Intl_Competitive_2	<---	F1	1.004	.027	37.294	***	par_4
Intl_Competitive_4	<---	F1	.976	.030	32.998	***	par_5
Intl_Competitive_5	<---	F1	1.022	.023	45.320	***	par_6
Intl_Competitive_6	<---	F1	.980	.031	31.929	***	par_7
Intl_Competitive_7	<---	F1	1.037	.031	33.712	***	par_8

Standardized Regression Weights			Estimate
F1	<---	ZUse	-.073
F1	<---	Inter_Use_NCAP	.217
F1	<---	ZNCAP	.158
Intl_Competitive_1	<---	F1	.948
Intl_Competitive_2	<---	F1	.979
Intl_Competitive_4	<---	F1	.978
Intl_Competitive_5	<---	F1	.959
Intl_Competitive_6	<---	F1	.953
Intl_Competitive_7	<---	F1	.962

5.10.4 Moderating Role of Networking Capability on the Relationship between CFC Program Use and Market Competitiveness (H3d)

Part D of the third hypothesis (H-3d) states that the NCAP of firms will moderate the effect of the use of the CFC program on their market competitiveness. This hypothesis was tested through the path model, as shown in Figure 5.23, by creating an interaction term between the independent (CFC Usage) and moderating variable (NCAP).

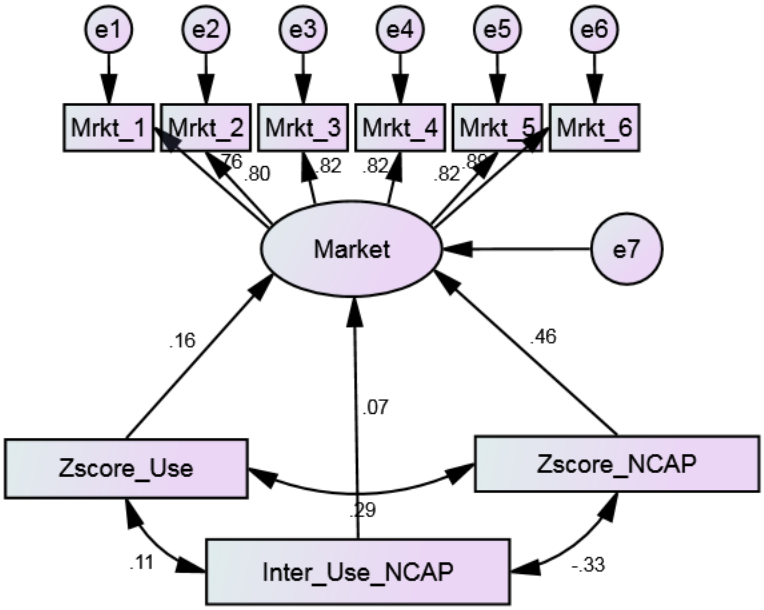


Figure 5.23: Standardised Weights of Interaction of CFC Use and Networking Capability with Market Competitiveness model

The outcome model fit met the accepted parameters of adequate model fit with CMIN/df=1.861, CFI=.980, GFI=.959, AGFI=.922, RMSEA=.062 and PCLOSE=.222. The standardised regression weight and significance level showed that there was no moderating effect of NCAP of the user SME on the effect of CFC program use on its market competitiveness. However, NCAP individually had a positive and significant direct effect on the market competitiveness of user firms.

Table 5.34: Regression Weights of SEM Model of Interactional effect of CFC Use and Networking Capability on Market Competitiveness

Regression Weights			Estimate	S.E.	C.R.	P	Label
F1	<---	ZUse	.148	.061	2.429	.015	par_9
F1	<---	ZNCAP_4_Items	.423	.068	6.254	***	par_10
F1	<---	Inter_Use_NCAP	.068	.067	1.016	.310	par_11
Market_Competitive_1	<---	F1	1.000				
Market_Competitive_2	<---	F1	1.005	.080	12.550	***	par_4
Market_Competitive_3	<---	F1	1.011	.079	12.868	***	par_5
Market_Competitive_4	<---	F1	1.056	.082	12.942	***	par_6
Market_Competitive_5	<---	F1	1.126	.086	13.019	***	par_7
Market_Competitive_6	<---	F1	1.156	.082	14.180	***	par_8

Standardized Regression Weights			Estimate
F1	<---	ZUse	.159
F1	<---	ZNCAP_4_Items	.455
F1	<---	Inter_Use_NCAP	.067
Market_Competitive_1	<---	F1	.762
Market_Competitive_2	<---	F1	.799
Market_Competitive_3	<---	F1	.816
Market_Competitive_4	<---	F1	.820
Market_Competitive_5	<---	F1	.824
Market_Competitive_6	<---	F1	.885

Since the moderation hypotheses are not significant in the study and these findings deviate from the theoretical and empirical findings of previous researchers, a further analysis was carried out to explore some other possibilities in the data. A regression model with region-based control variables was undertaken to determine if the relationship between CFC usage and firm competitiveness differed due to regional variation. Eighteen dummy variables of main CFC clusters/regions (every CFC

operates in its respective cluster/region) was created to control in the regression model. As detailed in methodology chapter, some more control variables existed, so it was appropriate to include them in this model to determine if their behaviour stayed the same with the inclusion of regional dummy variables. In the regression model, CFC usage was an 'independent variable', which was regressed with four dependent variables or dimensions of firm competitiveness (i.e. innovation, production, internationalisation, and market competitiveness). However, an additional model was calculated with a summative variable of all competitiveness dimensions (see model 5 in Table 5.35.).

Table 5.35 shows the findings of the regression models. The effect of CFC usage in the presence of all dummy variables was significant for innovation, production, and market whereas for internationalisation it is non-significant. This is consistent with what has been identified before through SEM. With respect to regional difference, most regions did not differ significantly in terms of the effect of CFD usage on firm competitiveness. There was only one region/cluster that differed significantly in term of CFC usage effects on firm's market performance; however, the total representation of this CFC in data set was 5%. There were two regions that differed with respect to the internationalisation effect; however, this effect was non-significant in the main regression model. Therefore, it is can be concluded from the results that the effect of CFC usage on different competitiveness dimensions of SMEs is consistent all over Pakistan.

Table 5.35: Regression results of CFCs' Regional/Cluster Dummy Variables

	Model 1 (DV) Market	Model 2 (DV) Internationalisation	Model 3 (DV) Production	Model 4 (DV) Innovation	Model 5 (DV) Competitiveness - All Dimensions
CFC Usage (IV)	**β** = .140 df = 222 F = 18.44 Sig.=.002*	**β** = .142 df = 222 F = .009 Sig.=.167	**β** = .156 df = 222 F = 13.63 Sig.=.011**	**β** = .105 df = 222 F = 6.99 Sig.=.002*	**β** = .543 df = 222 F = 6.76 Sig.=.010**
Control Dummy Variables	***Sig. (P – value)***	***Sig. (P – value)***	***Sig. (P – value)***	***Sig. (P – value)***	***Sig. (P – value)***
PDC_Sialkot	.598	.606	.215	.933	.796
NIDA_Lahore	.802	.364	.259	.688	.488
GTDMC_Gugranwala	.149	.806	.368	.944	.441
KTDMC_Karachi	.860	.770	.920	.253	.906
CDTC_Gujranwala	.317	.018**	.496	.162	.053
LESC_Gujranwala	.747	***.000****	.864	.603	.068
MIDC_Gujranwala	.714	.796	.942	.251	.961
AutoParts_Lahore	.118	***.001****	.071	.410	.448
CTFC_Mardan	.472	.418	.193	.923	.309
LPDI_Sialkot	.666	.615	.761	.920	.632
FDI_Gujrat	.325	.520	.659	.435	.398
CDC_Lahore	.716	.306	.714	.936	.730
CDC_Gugranwala	.986	.401	.244	.642	.378
CDC_Daska	.863	.638	.303	.788	.514
SIC_Sialkot	.885	.687	.704	.935	.781
GPDMC_Karachi	***.018****	.549	.888	.721	.870
FoundaryCentre_Lahore	.334	.305	.943	.476	.842

*Significant @ <.01, **Significant @ <.05

A summary of the research hypothesis tests results is given in Table 5.36.

Table 5.36: Summary of Research Hypotheses Tests Results

Hypotheses		Outcome
Hypothesis 1- The use of the CFC program will have a significant positive effect on firms':		
H-1a- Production Competitiveness	***β****= 0.245,* CR. 3.58 Sig. @ 0.001	Supported
H-1b- Innovation Competitiveness	***β****= 0.196* *CR. 2.75* *Sig. @ 0.001*	Supported
H-1c- Internationalisation Competitiveness	***β****= 0.000* *CR. 0.004* *Insig. @ 0.997*	Not Supported
H-1d- Market Competitiveness	*β**= 0.296*** *CR. 4.31* *Sig. @ 0.001*	Supported
Hypothesis 2 - The ACAP of firms will moderate the effect of the use of the CFC program on their:		
H-2a- Production Competitiveness	***β****= 0.039* *CR. 0.814* *Insig. @ 0.41*	Not Supported
H-2b- Innovation Competitiveness	***β****= 0.070* *CR. 1.06* *Insig. @ 0.21*	Not Supported
H-2c- Internationalisation Competitiveness	***β****= 0.231* *CR. -0.57* *Insig. @ 0.56*	Not Supported
H-2d- Market Competitiveness	***β****= -0.005* *CR. -0.08* *Insig. @ 0.93*	Not Supported
Hypothesis 3 – The NCAP of firms will moderate the effect of the use of the CFC program on their"		
H-3a- Production Competitiveness	***β****= 0.003* *CR. 0.046* *Insig. @ 0.96*	Not Supported
H-3b- Innovation Competitiveness	***β****= 0.035* *CR. 0.474* *Insig. @ 0.63*	Not Supported
H-3c- Internationalisation Competitiveness	β=.217 CR. 3.02 Sig.@ 0.01	Supported
H-3d- Market Competitiveness	***β****= 0.068* *CR. 1.01* *Insig. @ 0.31*	Not Supported

5.11 CONCLUSION

The objective of this chapter was to present findings of the statistical analyses to draw a conclusion about the hypotheses developed in Chapters 1, 2 and 3. Before testing the hypotheses, data was subjected to robust tests of normality and reliability, such as missing values analysis, outliers' identification, and Cronbach's alpha. EFA followed by CFA was performed to identify the best factor structure and ensure various facets of validity and reliability. Testing of hypotheses through SEM did not support most of the hypotheses. However, the hypothesis (H1a, H1B, H1D) stating "use of CFC program has a positive and significant effect on various dimensions of user firms' competitiveness" received statistical support. Discussion of the findings, along with the theoretical and managerial implications, will be made in the next chapter.

CHAPTER 6: DISCUSSION

The main objective of this research was to investigate the impact of the use of the CFC program on the competitiveness of user SMEs by considering the moderating role of user firms' dynamic capabilities such as ACAP and NCAP in this relationship. Drawing on previous empirical research on support programs and theoretical underpinnings of RBT and DCT, it was conceptualised that the use of the CFC program would have a positive effect on user SMEs' multiple competitiveness dimensions, and that ACAP and NCAP of user SMEs would moderate this relationship. The following section discusses findings compared to previous similar studies and explores insights offered by the extant literature.

6.1 THE EFFECT OF CFC PROGRAM USAGE ON SME COMPETITIVENESS

The first hypotheses derived from the support program literature and theoretical underpinnings of RBT, stated that the use of the CFC program would have a positive effect on four dimensions of user firm competitiveness: innovation, production, internationalisation, and market competitiveness. Structural equation modelling demonstrated that the use of the CFC program has a positive effect on production, innovation, and market competitiveness of user SMEs. However, the effect is not statistically significant for competitiveness in international markets. This finding is consistent with previous studies identifying the positive role of support programs on recipient firm performance (see Cravo & Piza 2019; Doh & Kim 2014; Jun, Seo & Son 2012).

The CFC program was conceived in light of poor production technologies, and technological knowledge and skills of SMEs in Pakistan. SMEs in Pakistan lack advanced production technologies and processes, which consequently limits their

capacity to innovate, compete in domestic and international markets, and achieve superior financial performance (Khattak, Arslan & Umair 2011; Mahmood 2006). The GOP, in collaboration with international development agencies, envisaged that the provision of state-of-the-art technologies and skills would enhance SME ability to improve their production technologies, innovation in processes and products, and overall performance in domestic and international markets. The finding of this study indicates that SMEs have been able to receive these competitiveness benefits through the use of the CFC program's various services. This further implies that SMEs understand their competitiveness priorities and utilise externally available technological resources to improve their competitiveness.

The differential explanatory power of model for all four competitiveness dimensions (i.e. Production β= *0.245;* Innovation β= *0.196;* Market β= *0.296)* provides support to the hypothesis that competitiveness of SMEs should be measured on multiple dimensions and that the effect of CFC program usage may have differential effects on all dimensions. Singh et al. (2008) assert that researchers largely analyse competitiveness in isolation and thus an adequate framework to quantify different dimensions of competitiveness (such as production, innovation, internationalisation, market) of SMEs has not yet been explored. From the statistically significant regression weights, it is evident that the effect of CFC program usage is highest on market competitiveness (explaining 30% of the variance) and least on innovation competitiveness (explaining 20% of the variance); whereas production competitiveness falls in the middle with 25% of the variance explained due to the use of the CFC program. Although previous studies have investigated the differential effects of different support services on user firm competitiveness (see Kotabe & Czinkota 1992; Nishimura & Okamuro 2011; Wilkinson & Brouthers 2000) studies

investigating the effects of support programs on different dimensions of competitiveness are rare. This implies that support programs do not necessarily contribute equally to all facets of competitiveness and thus are not the only type of SME support that matters. Further, the intensity of support and volume of usage improve the effectiveness of such interventions (Cravo & Piza 2019).

However, the hypothesis that the CFC program may enhance competitiveness of SMEs in international markets (exports) was not supported as the effect of the CFC program on the internationalisation dimension was statistically non-significant. This finding is consistent with Lages and Montgomery (2005) and Alonso-Nuez and Galve-Górriz (2012), who found no effect of government support programs on export performance. This implies that the mere provision of advanced production equipment and technological skills is not enough to improve SME competitiveness in international markets. Internationalisation is a unique and multi-staged process requiring investment and specific orientation, intention, and capabilities (Haddoud et al. 2017; Paul, Parthasarathy & Gupta 2017). However, despite the acknowledged benefits of exports and the pledged support by governments, SMEs do not export and stick with the operations within their country's geographical boundaries due to investment and risk involved in the internationalisation process (Tan, Brewer & Liesch 2018). Other reasons could include the irrelevance of CFC support services with production and product improvement processes of SMEs (Shahzad 2015), or the fact that SMEs have not used CFC technologies to produce products to meet international market demands. Policy makers and development agencies may revisit their support programs models and implementation to ensure that SMEs receive requisite knowledge and skills for internationalisation processes, along with access to critical hard and soft resources to compete in international markets. This implies that

government and development agencies need to design support programs with a blend of production technologies, technological skills, and knowledge of international markets and internationalisation process—all under one roof.

6.2 MODERATING EFFECT OF ABSORPTIVE CAPACITY AND NETWORKING CAPABILITY

Another finding of this study is related to the non-significant moderating roles of ACAP and NCAP in the relationship between CFC program usage and user SME competitiveness. Although previous studies on support programs have not considered the influence of dynamic capabilities of user firms/SMEs in investigating competitiveness effects, this finding is certainly contrary to DCT's arguments and empirical studies that have found a significant moderating effect of dynamic capabilities (i.e., ACAP and NCAP) in the investigated frameworks (García-Morales, Ruiz-Moreno & Llorens-Montes 2007; Teece, Pisano & Shuen 1997).

While conventionally significant findings are considered for discussion, unexpected and non-significant findings also offer important insights (Fanelli, 2012, Young et al., 2008). So, the non-significant findings of moderation of ACAP and NCAP suggest that it may be beneficial to revisit the theoretical assumptions, conceptualisation, and boundary conditions of dynamic capabilities and support programs. This finding implies that although SMEs benefit from the use of support programs, their dynamic capabilities (such as ACAP and NCAP) do not play any role in this process. The question of why SMEs do not use their dynamic capabilities to maximise value from support programs warrants further empirical investigation. However,, in light of the existing literature and empirical evidence, a few possible explanations could be explored here.

6.2.1 Moderating Effects of ACAP

The literature indicates that the provision of valuable external knowledge is beneficial to a firm but not a necessary condition for the development or utilisation of ACAP (Lane, Koka & Pathak 2006). Industry conditions, such as intensity of competition, demand, and price elasticity, may (de)motivate a firm to align its ACAP with externally available knowledge (García-Morales, Ruiz-Moreno & Llorens-Montes 2007). Also, ACAP is a specialised and event-centred capability that focuses on specific types of knowledge the firm needs (García-Morales, Ruiz-Moreno & Llorens-Montes 2007; Lane, Koka & Pathak 2006) to sustain competitiveness. It has also been argued in the literature that the motivation for a firm to invest in and utilise its ACAP diminishes when the externally available knowledge resource: is not relevant to the firm's internally developed competitive advantage, is a public good that any firm can use, offers low return, and/or has more prevalent knowledge spill overs (Qian & Acs 2013; Todorova & Durisin 2007). Therefore, user SMEs' spending on research and development/ACAP could be nominal for the CFC program because of the 'public good' nature of the program. This argument is understandable in light of the Ricardian rent and resource-based view that focuses on the creation of competitive advantage on the basis of the uniqueness and inimitability of the knowledge and resources held by the firm (Barney 1995).

Scholars of this stream argue that the competitive advantage of firms depends on the availability of unique resources and/or knowledge that are not available to others in the industry (Barney1995). Firms develop their ACAP around these resources and also tend to identify external resources that match or complement their already-held, unique resources. This does not seem to be happening in the case of the CFC program, since the user SMEs have not shifted the source of their competitive

advantage from internal unique technological knowledge to publicly available external knowledge (offered by the CFC). This implies that in the absence of uniqueness of the CFC program's services, the ACAP of user firms is unlikely to influence the effect of CFC program usage on competitiveness. This explanation is consistent with Shahzad's (2015) evaluation study of a CFC, which suggested that user and non-user firms were less enthusiastic about the CFC facilities because of the common nature of and public access to the same technologies and knowledge. SMEs were of the view that since the new technologies, product designs, and technological knowledge offered by CFCs were available to all firms, it was difficult for them to create a sustainable competitive advantage by using the resources endowed by their respective CFC. This could be the possible reason why the ACAP of user firms did not playing any significant role in the relationship between CFC program usage and firm competitiveness.

Expanding on the arguments of Lane , Koka and Pathak (2006) , García-Morales , Ruiz-Moreno and Llorens-Montes (2007), it can thus be argued that it is not a generalised ACAP that works for all kinds of external technologies and knowledge; instead CFC programs need to enable/support user SMEs to develop a specific or more CFC-centred ACAP. Specialised ACAPs may help SMEs understand and adapt advanced technologies, production processes, and technical skills offered by CFCs. This argument is consistent with García-Morales, Ruiz-Moreno and Llorens-Montes (2007), who conceived a special type of ACAP called 'technological absorptive capacity' while empirically investigating the impact of ACAP on learning and innovation in technology firms.

This explanation can be further strengthened with the help of some other findings from this study. For instance, in the structural model, the coefficients of the direct effects of

ACAP and NCAP on four dimensions of competitiveness are positive and statistically significant. If interpreted together with the above arguments, this finding can help to understand the underlying story. The user SMEs have developed their ACAP and NCAP based on the indigenous and conventional nature of technologies and competition. Also, these dynamic capabilities are aligned with their indigenous competitive advantage. Since the CFC program emerged recently with unconventional technologies and production processes, SMEs perhaps have not updated or transformed their knowledge processes and production technologies according to the CFC's pattern. This explanation is consistent with literature indicating SMEs' competitive advantage, production priorities and investment decisions are motivated by short-term gains and the immediate competitive context (Chapman & Hyland 2000; Haddoud, Jones & Newbery 2018; Lagacé & Bourgault 2003). The CFC program might have been taken by the SMEs as a transactional and short-term tool instead of a transformational opportunity (see Shahzad (2015) for a similar observation). This implies that SMEs might have adopted only those technologies, skills, and practices from CFCs that are aligned with their existing technological knowledge (or ACAP) and are more beneficial for their immediate market advantage (Tan, Brewer & Liesch 2018). This is consistent with the concept of 'technological opportunity' used in the literature that explains the feasibility (i.e., cost, time, and returns) associated with the adoption of new technologies, technological processes, and innovative practices (Nieto & Quevedo 2005). SME capability to use CFC program-based technological opportunities depends on their technological fields, the path they have followed in the past, and how long they have been close to similar technologies (Yang, Motohashi & Chen 2009). The CFC program has introduced unconventional production technologies and technological processes, so SMEs may not have developed or

transformed CFC-specific ACAP and NCAP; instead, they are using their indigenous and inherited competitive advantages (Liao, Tu & Marsillac 2010).

6.2.2 Moderating Effect of NCAP

The non-significant effect of NCAP on most competitiveness dimensions (i.e., production, innovation, and market competitiveness) can be explained with the arguments provided by the literature that acknowledge firms develop, expand and utilise their networks in relation to their resource needs and competitive advantage (Li et al. 2015). SMEs develop their NCAP and then networks to access resources (mostly technological knowledge and informational resources) that are critical for their competitive performance (Galkina & Chetty 2015). Collaboration and cooperation among different networks enable firms to take advantage of collective learning and knowledge spill overs that lead to superior performance (Alonso-Nuez & Galve-Górriz 2012; Aziz & Norhashim 2008; Braune, Mahieux & Boncori 2016). However, this network embeddedness can also cause a collective blind spot where, due to collective learning, firms gain only knowledge, insights, and technological information that matches typical market demands and their conventional production and product development processes (Klyver, Evald & Hindle 2011; Villena, Revilla & Choi 2011). This leads to a stage where SMEs focus primarily on what they ‘can’ do, instead of what they ‘should’ do. Consequently, the need and requirements of critical resources are established in the light of existing information and knowledge management capacity (i.e. ACAP). At this point, ACAP works as a guiding mechanism for NCAP in establishing the direction for network embeddedness and exploitation. Therefore, if the ACAP of user SMEs is not playing a significant role in reaping greater benefits from the CFC program then it is unlikely that NCAP, being a natural ally of ACAP, would play a role in this CFC usage-competitiveness relationship. In other words, user

SMEs of CFC programs form and collaborate within their networks to sustain (and not transform as per CFC program's preferences) their conventional production processes.

Scholars have argued that the strategy and approach of SMEs to access shared resources in close networks or industrial clusters is largely influenced by regional concentration, sectorial specialisation, the unique historical conditions and social landscape (Barney1991; Li & Geng 2012; Sonobe & Otsuka 2016). Given this, it is possible that SMEs networks would have evolved with traditional technological and competitive wisdom where firms embedded in these networks share and gain conventional knowledge and resources. This means SME NCAP would naturally be developed and evolved around such conventional networks, and that's might be the reason why it does not help SMEs to gain competitiveness benefits from the CFC program's advance and unconventional technologies and production methods. This explanation is supported by the positive and significant direct effect of NCAP on all competitiveness dimensions in the moderation model. NCAP does exist in SMEs and contribute to competitiveness; however, it does not help them with CFC resources.

Lack of moderation of NCAP could also be explained using social and economic perspectives. From a social perspective, social actors in clusters and networks might find a firm's decision to unfollow or deviate from the industry or collective practices to be a social deviation from conventions and historic practices. From an economic perspective, it could be risky because transformed production practices might not work in isolation and could require support from other organisations and network agents. However, due to social reasons, the concerned actors might deny support that could lead to production or market failure. This explanation is consistent with strategic management and entrepreneurship scholars who argue that organisational

orchestration and coordination of resources and capabilities are the critical determinants of competitive performance (Wennberg & Lindqvist 2010; Wiklund & Shepherd 2003a, 2003b). Firms' within-and-between network relationships enhance their efficiency to acquire technologies and transform production and product development processes to capitalise on market opportunities (Vesalainen & Hakala 2014). SMEs, due to inherent resource disadvantage, rarely carry out technological and product innovation activities alone. To avoid this deficiency they form technology and innovative networks, strategic alliances, and joint research and development activities (Freeman & Hagedoorn 1994; Gronum, Verreynne & Kastelle 2012; Mohannak 2007; Parida et al. 2017). SMEs also use networks to build their technological and innovative capabilities to identify and implement technology and product innovations (Mohannak 2007; Parida & Örtqvist 2015). This implies that SMEs perhaps cannot extract competitive advantage from shared resources (i.e., the CFC program) without effective networking (Giuliani & Bell 2005; Qian & Acs 2013). Nonetheless, SMEs might change or adjust their networking strategy and capabilities only if this change takes place collectively at the cluster or respective industry level. In the absence of an industry-wide integration, NCAP of user firms is unlikely to influence the effect of CFC program usage on competitiveness.

However, it is an important finding that NCAP moderates the effect of CFC program usage on internationalisation competitiveness. The direct effect of CFC program use on internationalisation competitiveness was negligible and insignificant, which means the CFC program's services could not influence SME performance in international markets. However, the coefficient value of the CFC program used in the presence of NCAP turned positive and significant (β=.217, p=0.01), which implies that SMEs with a higher NCAP perform better in international markets than their counterparts.

Previous studies have not studied this relationship in the same way, but this finding is consistent with the previous theoretical and empirical literature that highlights the positive role of SME's NCAP in gaining competitiveness benefits (Degong et al. 2018; Lasse et al. 2019; Singh, Garg & Deshmukh 2009; Zhou, Wu & Luo 2007). Organisational networks and NCAP foster SME internationalisation by leveraging from resources embedded in networks (Lasse et al. 2019). The change in the CFC program's effect (i.e., from non-significant to significant) in the presence of the moderating effect of NCAP implies that internationalisation in SMEs may occur via network learning and through the gradual acquisition or development of technologies, products, and knowledge for international markets (Lasse et al. 2019; Oparaocha 2015).

CHAPTER 7: CONCLUSION

7.1 THESIS OVERVIEW

Many researchers and practitioners have advocated for external support as an effective tool to improve SME competitiveness (Doh & Kim 2014; Freixanet 2012; Kang & Park 2012). The literature has, however, produced mixed evidence on the effectiveness and contribution of such programs. Technological support, with the provision of production-related technologies, knowledge, and skills, has emerged recently, anticipating that advanced production techniques will improve SME innovation and overall competitiveness in domestic and international markets (Shahzad 2015). However, there is little research available on the effectiveness of support programs in general, and technological support in particular. It has also been noted by previous scholars that the user firms of support programs have yielded differentiated benefits in the same industry and with the same program. This indicates that a nuanced approach is required to explore support program models by considering the factors that may influence the ability of firms to avail higher benefits from such support programs. This study therefore aimed to investigate the effect of a technology-based support program, the CFC, on the competitiveness of user SMEs by keeping the possible role of firms' dynamic capabilities in yielding greater competitiveness outcomes from the use of the support program.

This study has demonstrated important insights regarding the effectiveness of support programs such as the CFC program. Findings revealed that although the provision of advanced production technologies and skills improve SME production, innovation and performance in domestic markets, this effect is not evident in international markets. Scholars and policy makers need to understand that international market performance

perhaps goes beyond the innovation, advanced production infrastructure, and financial performance in domestic markets. The literature and DCT provided a rationale and empirical evidence for the critical role that firms' dynamic capabilities play in gaining advantage from external resources. However, the findings revealed that the user firms' existing ACAP and NCAP do not play a statistically significant role in yielding competitiveness from the use of an external support program. The discrepancy between the theory and literature and findings open up new avenues for scholars to revisit and re-rationalise the potential role of firms' capabilities in using external support. For example, perhaps 1) user SMEs are not using their dynamic capabilities (existing soft resources) for CFC program due to a perceived mismatch, and/or 2) their existing ACAP and NCAP are irrelevant to the CFC program-led competitiveness landscape. An industry, sector, and cluster level collective consolidation may be required to align an SME's indigenous sources and processes of competitive advantage with external support programs. The literature has indicated that manufacturing improvement programs may not yield the required performance outcomes unless they are aligned with the user firm's strategic and competitive priorities (Lagacé & Bourgault 2003). Theoretical, methodological, and policy reviews are required to study and enhance the effectiveness of SME support programs due to their fundamental complicated nature and design.

7.2 THEORETICAL IMPLICATIONS

Several implications for theory and research can be drawn from this study's findings.

First, our knowledge on the effect of support programs in general, and CFC program in particular, is very limited. The mainstream literature on support programs has ignored new developments in the designs and models of support programs and their role as an important antecedent of SME competitiveness. This study found that the

CFC program, with its blended (i.e., hard and soft) and production-specific support services, has a significant influence on different dimensions of competitiveness. Therefore, this study enriches the literature and theory of support programs by validating the CFC program as an antecedent to the SME competitiveness model and extending empirical support through rigorous statistical techniques.

Second, this study develops a customised, theory-informed, comprehensive, and multidimensional measurement scale for SME competitiveness. This provision of a multidimensional and validated scale to measure SME performance is an important and much needed contribution (Vlachvei & Notta 2016). The proposed construct contained four dimensions to measure competitiveness in the context of SMEs. The measure was developed and validated following a rigorous process involving exhaustive literature review, expert opinion, pilot testing, and statistical validation. At the early stage, items were identified from the literature, however at EFA and CFA stages, several items were removed, and the final construct appeared with a theoretical rationale. Findings of this study provided support for the multidimensional construct of firm competitiveness as the CFC program's use had differential effects on all four dimensions of competitiveness. Scholars can use this multidimensional competitiveness measure in future studies to obtain comprehensive and multifaceted measurements of competitiveness.

Third, this study introduced the link between RBT and DCT to understand support program effectiveness frameworks and to capture the role of SMEs' dynamic capabilities in harnessing higher competitiveness through the use of support programs. Although most of the theoretically permissible moderating effects are not supported, the statistically significant finding of the moderating effect of NCAP on the relationship between CFC program use and internationalisation competitiveness

provides some support to discuss and further explore this area. Interestingly, in the main model the direct effect of CFC program use on internationalisation competitiveness was negligible and statistically non-significant. However, when combined with NCAP, the effect of the CFC program on internationalisation competitiveness became positive and statistically significant (β=.217, p=0.01). This finding provides some rationale for the need to understand support programs beyond resource-based perspective to explore the complexities involved in and to improve their effectiveness. Taken together, if the CFC program contributes differentially to SME competitiveness and NCAP moderates this effect, there could be potential insights to explain why and how the effects of support programs differ.

Fourth, this study provides theory and research a reference point about the differential effects of support programs on user firms' competitiveness outcomes to better theorise and frame the effectiveness of support programs on different dimensions. It is established by the findings that the program's utility could be higher in domestic markets but not in international markets. The combined effect of CFC services is different on production, innovation, and market competitiveness. Efforts could be made to understand the determinants of this difference. The effect of CFC program on internationalisation competitiveness is not evident. This provides researchers a point to reconsider the role of technologies in export or international performance. The aim of governments in developing and offering technological support programs is to render support to strengthen the competitive standing of firms in international markets. There may thus be a need for a more in depth and qualitative look at the effect of support programs to ascertain if they are suited to user SMEs in particular industries, and if there is a need for export coaching for these firms.

Fifth, the literature advocates for the critical role of firms' existing capabilities in harnessing benefits from external resources (Wu et al. 2010). However, this study has found that the in the case of the CFC program, dynamic capabilities such as ACAP and NCAP do not help in the achievement of higher competitiveness benefits from the use of CFC services. This insight may help scholars to revisit or identify the boundary conditions of the theories. Another important theoretical insight is the complementary nature of ACAP and NCAP. It is imperative to consider both simultaneously because in this study, there is a strong and positive correlation between ACAP and NCAP. Also, both capabilities have significantly positive direct effects on all competitiveness dimensions. Neither have moderating effects on the main relationship. This could be because ACAP provides directions for establishing networks to obtain the required knowledge resources from external networks. Given this complementarity, theorists can develop model and theories to explain how and why dynamic capabilities can be developed along with soft and hard supports to make support programs more effective.

Sixth, this study enriches the support program literature by introducing a newly emerged, SME-focused, blended support program, which offers a mix of critical production facilities, production technologies, technical skills, research and development facilities, and critical information about technologies and markets. Previous studies have been focused on support programs that either provide finances and information (i.e., export promotions) (Ayob & Freixanet 2014; Shamsuddoha, Ali & Nelson Oly 2009) or access to advanced production technologies (Lagacé & Bourgault 2003). The CFC program emerged as a new SME support strategy with focus on both tangible and intangible resources and the provision of both hard and soft technological support to SMEs with poor technological skills. Due to rapid technological advancement and globalisation, contemporary competition has recently

moved to innovation and value-addition, which requires technological advancement. The provision of only information and skills does not enable SMEs to create competitive advantage (Molina-Morales & Expósito-Langa 2012; Liberati et al. 2016). SMEs, along with soft resources, also need hard production setup to develop innovative products that have the capacity to compete in domestic and international markets.

Another implication of this study is the provision of empirical information about support programs in the context of developing countries. The availability of scientific knowledge about these markets may help scholars to compare and evaluate the effectiveness of such programs all around the world. Pakistan has accumulated a significant amount of experience in designing and implementing support programs that address entrepreneurship development, and skills and technological upgrading of SMEs to foster their competitiveness. Therefore, it is important for researchers, development agencies, and host countries to determine how this new development approach and blended design of support programs has served the needs of multiple stakeholders. Insights gained from the study of CFC programs will help these stakeholders use cross-country learning to define and design industrial policy and development strategy for the future support programs.

7.3 IMPLICATIONS FOR POLICY MAKERS AND SME MANAGERS/OWNERS

When seeking technological support from government, SME owners and managers should have a clear vision of CFC scope and potential and commit to internal capacity building and exporting. They should structure production processes and management practices in their enterprises in such a way that export support mechanisms are firmly consistent with support programs. This will happen when SMEs understand that the establishment of the CFC program is to develop their internal technological capacity

and organisational mechanisms to become competitive in domestic and international markets. At present, it seems that the 'crowding-out' effect is more prevalent than the 'additionality'. SME owners and managers can avoid this crowding-out effect by 1) pledging exclusive resources (financial and non-financial) for the CFC program, 2) understanding that the CFC program is not different from their existing competitive advantages, and 3) realising that the CFC program is a learning and development opportunity and any investment made will bring greater return in the long run. Future researchers can examine the social landscape and conventions of clusters/industries/sectors to identify that what kind of social fabric and collective wisdom would be more appropriate to make support programs more effective.

Another recommendation for policy makers is that they can design such support programs by keeping the social, technological and economic aspects of recipient industries, clusters, and SMEs (Shahzad 2015). Alvarez (2004) asserts that a positive contribution to export competitiveness can be realised if SMEs pledge greater effort in international business, process innovation, and complement these with utilisation of technological support programs. Hence, the implication is that while CFC program does not support international competitiveness of SMEs, there may be value for researchers to conceptualise how a technological support program can extend export-specific resources and capabilities to help firms meet the challenges of the international market.

Policy makers and scholars may strive to identify the mechanism that will ensure that the user SMEs: 1) use exploratory learning to effectively recognise and understand the potentially valuable new knowledge outside the firm, 2) use transformative learning to assimilate new knowledge, and (3) use the assimilated knowledge to create explorative new knowledge to produce both exploitative and explorative innovation.

This recommendation should work as the dynamic capabilities help SMEs develop ACAP to acquire and apply technological knowledge from support programs to transform their production technologies and processes to achieve competitiveness in domestic and international markets through breakthrough product innovation (explorative). For managers of SMEs seeking successful internationalisation in scale and scope, the results of this study emphasise the need to develop dynamic capabilities to make the best use of domestic support to expand operations into international markets.

Policy makers should also be mindful that market complexities, along with rivalry in international markets, would require regular refinements in ensuring that CFCs and other related support programs are in accordance with the current needs of SMEs and that they meet the challenging demands of international customers.

In terms of implications for SME managers/owners, the findings highlight the importance and relevance of networking capabilities of SMEs in succeeding in international markets through CFC program's support. Hence, SMEs managers are strongly encouraged to invest in and make use of their networks and CFC program as this combination is helpful in increasing their international performance. More importantly, CFC program's usage alone does not help firms compete internationally, and it is suggested that SMEs managers should form cooperative and collaborative networks with domestic and foreign buyers and allocate sufficient resources to enhance these links. Networking with domestic and international SMEs appears to be another mechanism that helps SMEs overcome various resource failures and turn existing means into valuable resources. Therefore, it would be beneficial for SME managers to effectively take advantage of their existing network relationships in both domestic and international markets by developing regular conversations with their

associates. This will allow further development of their existing resources as well enable the flow of information and knowledge necessary to achieve the goal of internationalisation.

Extant literature affirms the value of support programs in increasing firm competitiveness. However, the literature offers mixed findings with respect to the effect of support programs on firm competitiveness. The findings of the current research were also mixed in relation to the effectiveness of the CFC program offered by the GOP. The conclusions, however, do show that further research with more rigorous approach is warranted in this area. It is with this challenge in mind that the limitations and directions for future research are outlined.

7.4 LIMITATIONS

This study contains a few limitations, which are considered normal for a study of this magnitude. Dolen et al. (2004) argue that the identification of limitations strengthens the study. Therefore, we suggest caution when interpreting and using this study's findings.

First, the sample of this study was obtained from CFCs, some of which did not actively maintain logs. Most CFCs kept the information about active user SMEs. Therefore, it is possible that the list of user SMEs generated after this exercise is not exclusive and some irregular or random users of the CFC program are omitted in the final sample list. Collecting an exhaustive list is expensive and time consuming because researchers have to collect it using a snowball approach since this information is not available on any single platform. Though this omission does not affect the quality of this study's findings, caution is recommended for interpretation and generalisation.

Second, the data is collected from firms located within Pakistan and is cross-sectional. A study with cross-country data could be beneficial to compare the findings in diverse international markets. The sample size of this study is small, and responses about dependent and moderating variables were obtained through self-reported and subjective measures, which are considered to be prone to bias. Although the sample list includes all active users and recommended precautions (both methodological and statistical) were taken to avoid self-bias, the possibility of common method bias remains.

Third, SME competitiveness dimensions included only innovation, production, internationalisation, and market. More dimensions could be included to identify additional facets of competitiveness where support programs can contribute. Fourth, this research provides generalisations for manufacturing SMEs operating in multiple sectors. The findings of this study should be generalised to similar contexts with caution.

Fourth, this study is limited in its focus on the effects of support program's usage on competitiveness of user firms. It is not considered as how entrepreneurial characteristics, financial and non-financial resources strength, and exports orientation and intensity contribute into their preferences to engage in support programs. Also, this study has not made comparisons between these characteristics of SMEs and their user behaviour/uptake/self-selection of CFC services across regions/clusters.

Finally, this quantitative study is limited in its ability to explore the reasons for unusual findings and why a phenomenon has taken place. For instance, the findings show a significant effect of CFC program use on three out of four competitiveness dimensions. On the other hand, the moderating role of dynamic capabilities was not significant in

this relationship. This variation and difference may be explained by including more variables in the framework.

7.5 FUTURE RESEARCH

Despite some limitations, this study has the potential to offer important insights for future studies mainly arising from the development and testing of a newly developed instrument for SMEs competitiveness, and unusual and unexpected non-significant relationships of moderating variables.

First, the study reveals that the use of the CFC program carries no significant effect on internationalisation/export competitiveness of SMEs. This extends to the value of the role of CFC program in helping SMEs achieve economic and non-economic outcomes in international markets. The objective for governments in conceiving and designing support programs for SMEs, such as the CFC program, is to provide advanced technologies and skills to strengthen production standards and output of SMEs that will enhance their competitive standing in export markets and consequently contribute to the country's economy. There may, therefore, be a need for an in-depth and qualitative review of the contribution of individual CFC programs to ascertain if they match the specific needs and capabilities of clusters, industries and SMEs, or if there is a need for specific export-centred training, coaching and mentoring for these enterprises. This may help to get information about the range and scope of support programs' facilities and services.

Further in-depth investigation may also provide information to the developers of such specific support programs regarding the peculiarities of specific sectors and consequent design of more user-friendly and useful programs. Haddoud, Jones and Newbery (2018) assert that a positive international performance can be better realised

through an international mindset, and process and product innovations. The findings show that CFC program usage has relatively little effect on innovation competitiveness. This could be because of lack of awareness about how the CFC program, with its technological support, can facilitate SMEs. So, the lack of focus among SMEs to gain innovation advantages from the CFC program could be the reason that their performance in international markets has not been affected by this program. Hence, while the CFC program extends support in other non-export related competitiveness dimensions, there may be value for researchers to explore firm readiness and commitment to developing their own resources and capabilities, apart from utilising the CFC program, to meet the challenges of the international environment.

Second, the findings of this study confirm that the CFC program has a direct influence on multiple competitiveness dimensions. This indicates that further exploration and investigation is now required. It remains unknown what is the mechanism through which CFC program effects firm competitiveness. Therefore, future researchers can investigate the mediating mechanism underlying program use; the competitiveness relationship.

Third, like every adapted and newly developed construct, the theory-driven and multi-dimensional measure of SMEs competitiveness can be used and tested in future empirical studies within the context of SMEs in Pakistan. This instrument or measurement approach could be used in other countries, both developing and developed, with modifications. This will help generalise the reliability and validity of the measure in different contexts. Scholars can also develop a customised tool that will incorporate the items relevant to technological development and export outcome

related aspects of CFCs that are specific to SMEs. A separate tool for technological ACAP and NCAP is also recommended.

Fourth, future studies may include firms across borders that use similar support programs through longitudinal studies. This would provide important information about differences in proposed relationships at different times.

Fifth, an important conceptualisation of this study is to look beyond the static approach of focusing only on the conducive conditions and include the capacity of firms to learn and absorb knowledge from network resources to accelerate their growth potential, a concept consistent with 'entrepreneurial ecosystem'. So future researchers may investigate as how user firms' dynamic capabilities such as ACAP and NCAP contribute into the development of entrepreneurial ecosystem and later help them take advantage of knowledge spillovers among the networks. Specifically, studies can base on the knowledge spillovers theory of entrepreneurship and entrepreneurial ecosystems to see how small and medium firms in Pakistan interact with and learn from each other for technology and manufacturing improvement purposes. Dynamic capabilities allow SMEs to discover and evaluate technological opportunities in entrepreneurial ecosystem and exploit them to gain maximum competitiveness benefits.

Finally, future studies may increase sample sizes and use objective measures of firm competitiveness. A customised instrument can be developed that measures the dependent and especially moderating variables in light of government's and support program's intended outcomes. For dynamic capability constructs, as discussed in the previous chapter, a customised scale needs to be deployed to measure CFC program-focused ACAP and NCAP among SMEs.

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APPENDIX 1: INITIAL VERSION OF THE QUESTIONNAIRE

Invitation to Participate in Research Project

Participants Information Statement

Project Title: Evaluating the Effect of 'Common Facility Centre Program' on SMEs Competitiveness in Pakistan

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3) Dr. Afreen Huq (Research Supervisor, afreen.huq@rmit.edu.au)*

4) Dr. Meg Elkins (Research Supervisor, meg.elkins@rmit.edu.au)*

*College of Business, RMIT University, Melbourne, Australia

Dear SME Owner/Manager

You are invited to participate in a research project being conducted by RMIT University, Melbourne, Australia. This research project aims to investigate the contribution of Government of Pakistan's Common Facility Centre (CFC) Program in SMEs' competitiveness. In order to achieve this aim, information about the use of CFC services and different aspect of firm competitiveness is required from the SMEs who are using this program. This letter describes the research project in simple and straightforward language. Please read this letter carefully to understand its content before deciding to participate in this survey. If you have any questions regarding this research, please ask one of the investigators above.

I am Khuram Shahzad, enrolled in PhD Management program at RMIT University, Melbourne, Australia. This research is being supervised by Prof. Dr. Pia Arenius, Dr. Afreen Huq, and Dr. Meg Elkins. This research project has been approved by the RMIT Human Research Ethics Committee. This research is being undertaken as part of the requirements for the degree of Doctor of Philosophy (PhD) in Management. The primary research question for this study is to what extent CFC program in Pakistan have contributed to the competitiveness of SMEs? The study specifically looks whether the use of CFC services improves production, innovation, export, and market competitiveness of SMEs. In addition this

research investigates some other factors such as absorptive capacity and networking capability of SMEs.

You have been invited to participate in this survey because information for the effectiveness of CFC is to be collected from SMEs who are actually using this program. This study is very important for policy makers, CFC management, and SMEs of Pakistan to gain research-based insights about the effectiveness of CFC program. Your cooperation in this regard is critical for the successful execution of this research project and to make Pakistan benefit from the research insights.

There are no perceived risks associated with participation in this research. Participation in this research is totally voluntary and anonymous. You are under no obligation to participate in this survey and thus you can refuse to participate or withdraw your participation at any stage of this survey. Your confidentiality and privacy will be maintained strictly and in highly professional manner. You and your organisation will not be identifiable in the thesis report and in the data set. However, I would be able to provide generic results and copy of the report upon your request as soon as it is published. The report will provide you with the insights about the level of use of CFC services by SMEs and its effect on their production, innovation, export, and market competitiveness. The thesis report and subsequent publications will be based on aggregated results. The collected data will only be seen by the investigators. Any information that you provide can be disclosed only if 1) it is to protect you or others from harm, 2) a court order is produced, or 3) you provide me with written permission. The data collected in this research will be kept securely at RMIT University for 5 years after publication before being destroyed. The final thesis will remain online. Because of the nature of your participation in this research, I am not obtaining a written consent from you. Instead, I am assuming that you have given your consent to participate in this survey by returning me the completely filled up questionnaire.

If you have any queries regarding this research project, please call me at 0333 4361678 or email me at khuram.shahzad@rmit.edu.au or my supervisors listed above. Any complaints about your participation in this research project can be directed to the Chair,

Business College Human Ethics Advisory Network, College of Business, RMIT, Melbourne, Australia, phone +61 399 255 596, email: bchean@rmit.edu.au. Details of the complaint procedure are also available at http://rmit.net.au/browse;ID=2jqrnb7hnpyo.

I thank you for your time and patience.

Khuram Shahzad, PhD Candidate

School of Management, RMIT University, Melbourne, Australia

Contact: Email - khuram.shahzad@rmit.edu.au

The Survey Questionnaire

Project Title: Evaluating the Effect of 'Common Facility Centre Program' on SMEs Competitiveness in Pakistan

Section -1: Profile of the Firm

Please provide the following information about your firm to the best of your knowledge by writing/ticking/circling the most relevant answer.

1) What is your position/designation in the present company?

_____

2) What is the highest level of education of the owner of this firm?

☐ Matric or Lower ☐ Intermediate (i.e. F.A/FSc etc.) ☐ Bachelor Degree (i.e. B.A/BSc etc. ☐ Master Degree (i.e. M.A/MSc etc.)

☐ Higher Degree (i.e. MPhil/PhD etc.) Any other, please specify _____

3) How many years of experience does owner of this company have in this industry?

_____ year(s)

4) How long has your firm been in the business?

☐ Less than a year ☐ 1-4 years ☐ 5-8 years ☐ 9-12 years

☐ More than 12 years

5) Please specify in what industry/sector your firm is operating?_____

6) Is this firm a family business?. ☐ Yes ☐ No

7) What is the ownership arrangement of this firm?

☐ Sole Proprietorship ☐ Partnership ☐ Public Limited

8) Was this firm established by the current owner? ☐ Yes ☐ No

9) How many employees do you have in this firm?

☐ 1-9 employees ☐ 10-25 employees ☐ 26-99 employees

☐ More than 100

10) In which province/state is your company located? Punjab ☐

Sindh ☐ Khyber Pakhtunkha ☐ Balochistan ☐

11) In which city/town/area your firm is located? _____

12) Your firm operates;

Locally (only in one province) ☐ Nationally ☐

Locally/Nationally and Internationally ☐

13) Is your firm participating in any other government or industry support programs?

Yes ☐ No (if No, please skip next question) ☐

14) What kind of services you receive from other government or industry support programs? Please tick all relevant boxes.

☐ Technological ☐ Financial ☐ Information ☐ Skills development

Any other _____

15) Has your firm received any external loan or technological grant from government or other institutions? ☐ Yes ☐ No

16) Does your company export products to other countries? ☐ Yes ☐ No (If No, please skip Q #. 14 & 15)

17) If yes, when your company made its 1st export? _____(year)

18) How your firm sells its products to overseas customers? Please tick all relevant boxes.

☐ Local export trading house

☐ Foreign buyer's local representative in Pakistan

☐ Direct selling to foreign buyers

☐ Exporting through company sales representatives in foreign markets

☐ Contact with customers and sale through participation in international trade fairs

☐ Different Export Promotion activities offered by Singapore Government

19) What is the distance between your firm and Common Facility Centre?

☐ Less than 2 Kilometres ☐ 3 to 5 Kilometres ☐ 6 to 10 Kilometres ☐ More than 10 Kilometres

20) What is the age group of the owner of this firm?

☐ Less than 25 years old ☐ 26 - 35 years old ☐ 36 – 45 years old

☐ 46 – 55 years old ☐ more than 55 years old

21) What is the gender of the owner of this firm? ☐ Male ☐ Female

Section -2

Usage of Common Facility Centre (CFC) Services

Please indicate the name of Common Facility Centre (CFC) you are most participating with_____

Please indicate the extent to which you have used the following services of CFC during the last 3 years.

Common Facility Centre (CFC) Services	Never Used	Little Extent……Large Extent							Number of times your firm used this services during last 3 years
		1	2	3	4	5	6	7	
1) Production facility	0	1	2	3	4	5	6	7	_____times
2) Material testing and inspection services in the laboratory	0	1	2	3	4	5	6	7	_____times
3) Design, prototype, and development of new products facility	0	1	2	3	4	5	6	7	_____times
4) Technical training services	0	1	2	3	4	5	6	7	_____times
5) Technical consultancy services	0	1	2	3	4	5	6	7	

									_____times
6) Awareness seminars/events	0	1	2	3	4	5	6	7	_____times
7) Technical and non/technical/management courses and diplomas	0	1	2	3	4	5	6	7	_____times
8) Export related services	0	1	2	3	4	5	6	7	_____times
9) Social networking and get together events	0	1	2	3	4	5	6	7	_____times

Absorptive Capacity

Please indicate your level of (dis)agreement with the following statements by using the given scale in front of each statement.

	Strongly ……..……...Strongly						
	Disagree			Neutral			Agree
	1	2	3	4	5	6	7
Excluding the help received from this centre, our firm has the capability to…							
1) Adapt acquired new knowledge to fit the firm's development needs	1	2	3	4	5	6	7
2) Develop new product/service by using assimilated new knowledge	1	2	3	4	5	6	7
3) Develop new applications by applying assimilated new knowledge	1	2	3	4	5	6	7
4) Find alternative uses of assimilated new knowledge	1	2	3	4	5	6	7
5) Fuse assimilated new knowledge with existing knowledge	1	2	3	4	5	6	7

6) Revise production processes based on acquired new knowledge	1	2	3	4	5	6	7
7) Revise business procedures based on acquired new knowledge	1	2	3	4	5	6	7
8) Introduce product innovation based on acquired new knowledge	1	2	3	4	5	6	7
9) Revise quality control operations based on acquired new knowledge	1	2	3	4	5	6	7

Networking Capability

Please indicate your level of (dis)agreement with the following statements by using the given scale in front of each statement.

	Strongly ……..…….....Strongly						
	Disagree			Neutral	Agree		
In our firm…	1	2	3	4	5	6	7
1) We have developed good relationship with our suppliers	1	2	3	4	5	6	7
2) We have developed good relationship with our customers	1	2	3	4	5	6	7
3) We have developed good relationship with our direct competitors	1	2	3	4	5	6	7
4) We have developed good relationship with universities/colleges/research-based institutions	1	2	3	4	5	6	7
5) We have developed good relationship with export promotion institutions (i.e. Export bureau, Export centres etc.)	1	2	3	4	5	6	7
6) We have developed good relationship with banks and financial institutions	1	2	3	4	5	6	7
7) We have developed good relationship with industry associations/chamber of commerce	1	2	3	4	5	6	7
8) We have developed good relationship with Common Facility Centre's (CFC) administration and management	1	2	3	4	5	6	7

9) We have developed good relationship with government officials or individuals who sit on government committees related to this industry	1	2	3	4	5	6	7
10) We have developed good relationship with technology-based institutions	1	2	3	4	5	6	7

Production Competitiveness

Please indicate your level of (dis)agreement with the following statements by using the given scale in front of each statement.

Statements	Strongly ……..…….....Strongly Disagree			Neutral	Agree		
	1	2	3	4	5	6	7
1) During the last 3 years, overall production cost of our firm has been lesser than our competitors	1	2	3	4	5	6	7
2) During the last 3 years, wastage or scrap rate of our firm has been lesser than our competitors	1	2	3	4	5	6	7
3) During the last 3 years, on time-in full-delivery performance of our firm has been better than our competitors	1	2	3	4	5	6	7
4) During the last 3 years, production flexibility of our firm has been better than our competitors	1	2	3	4	5	6	7
5) During the last 3 years, production time or manufacturing throughput time of our firm has been better than our competitors	1	2	3	4	5	6	7
6) During the last 3 years, overall production function i.e. production processes, volume, schedules etc. of our firm have been more flexible than our competitors	1	2	3	4	5	6	7
7) During the last 3 years, delivery speed of our firm has been better than our competitors	1	2	3	4	5	6	7
8) During the last 3 years, production lead time of our firm has been better than our competitors	1	2	3	4	5	6	7

9) During the last 3 years, overall product quality (i.e. reliability, durability, conformance to specs etc.) of our firm has been better than our competitors	1 2 3 4 5 6 7
10) During the last 3 years, product development cycle time of our firm has been better than our competitors	1 2 3 4 5 6 7
11) During the last 3 years, value addition of our firm has been better than our competitors	1 2 3 4 5 6 7
12) During the last 3 years, equipment and production technologies of our firm has been better than our competitors	1 2 3 4 5 6 7
13) During the last 3 years, level of production automation of our firm has been better than our competitors	1 2 3 4 5 6 7
14) During the last 3 years, quality control system of our firm has been better than our competitors	1 2 3 4 5 6 7
15) During the last 3 years, overall manufacturing performance of our firm has been better than our competitors	1 2 3 4 5 6 7

Internationalisation Competitiveness

Please indicate your level of (dis)agreement with the following statements by using the given scale in front of each statement.

Strongly ……..…….....Strongly

Disagree Neutral Agree

1 2 3 4 5 6 7

During the last 3 years…

1)	My firm has entered into new foreign markets	1 2 3 4 5 6 7
2)	My firm's export sales volume has increased	1 2 3 4 5 6 7
3)	My firm has achieved positive growth in exports sales	1 2 3 4 5 6 7
4)	My firm's profitability from exports has increased	1 2 3 4 5 6 7
5)	My firm's exports contribution in total sale has increased	1 2 3 4 5 6 7
6)	My firm's profit from export sales is higher than profit from domestic sales	1 2 3 4 5 6 7
7)	My firm's overall export performance has increased	1 2 3 4 5 6 7

Innovation Competitiveness

Please indicate your level of (dis)agreement with the following statements by using the given scale in front of each statement.

Statements	Strongly ……..…….....Strongly Disagree Neutral Agree 1 2 3 4 5 6 7
1) In comparison with competitors during the last 3 years, our firm has introduced more new or significantly improved products and services	1 2 3 4 5 6 7
2) In comparison with competitors during the last 3 years, our firm has introduced more new or significantly improved processes of manufacturing or producing goods or services	1 2 3 4 5 6 7
3) In comparison with competitors during the last 3 years, our firm has incorporated more advanced manufacturing equipment and technologies	1 2 3 4 5 6 7
4) In comparison with competitors during the last 3 years, our firm has been perceived more innovative in all necessary aspects	1 2 3 4 5 6 7

Market Competitiveness

Please indicate your level of (dis)agreement with the following statements by using the given scale in front of each statement.

Statements	Strongly ……..…….....Strongly Disagree Neutral Agree 1 2 3 4 5 6 7
1) During the last 3 years, Sales growth rate of our firm has been better than our competitors	1 2 3 4 5 6 7

2) During the last 3 years, market share growth rate of our firm has been better than our competitors	1	2	3	4	5	6	7
3) During the last 3 years, profitability of our firm has been better than our competitors	1	2	3	4	5	6	7
4) During the last 3 years, return on investment (ROI) of our firm has been better than our competitors	1	2	3	4	5	6	7
5) During the last 3 years, overall productivity of our firm has been better than our competitors	1	2	3	4	5	6	7
6) During the last 3 years, overall competitive position of our firm has been better than our competitors	1	2	3	4	5	6	7

Thank you so very much for your time and cooperation.

If you would like to receive findings/results of this research, please provide your;

Email Address written in Capital

Words:_____

Phone #. _____

APPENDIX 2: MODIFIED AND FINALISED VERSION OF INSTRUMENT

Invitation to Participate in Research Project

Participants Information Statement

Project Title: Evaluating the Effect of 'Common Facility Centre Program' on SMEs Competitiveness in Pakistan

Investigators

5) Khuram Shahzad (PhD Scholar, khuram.shahzad@rmit.edu.au)*

6) Prof. Dr. Pia Arenius (Research Supervisor, pia.arenius@rmit.edu.au)*

7) Dr. Afreen Huq (Research Supervisor, afreen.huq@rmit.edu.au)*

8) Dr. Meg Elkins (Research Supervisor, meg.elkins@rmit.edu.au)*

*College of Business, RMIT University, Melbourne, Australia

Dear Chief Executive Officer (CEO)

You are humbly requested to participate in this survey that aims to investigate the contribution of Government of Pakistan's Common Facility Centre (CFC) Program in improving SMEs' competitiveness. In order to achieve this aim, information about the use of CFC's facilities and services along with different aspects of firm competitiveness is required from the Chief Executive Officer (CEO) of the SMEs who are using this program. You are being contacted because your firm has been availing facilities and services of one of such Government of Pakistan's Common Facility Centres (CFC) namely _____:

This letter describes the research project in a simple and straightforward language. Please read this letter carefully to understand its content before accepting our request to participate in this survey.

I am Khuram Shahzad, doing PhD in Management at RMIT University, Melbourne, Australia. This research is being undertaken as part of the requirements for my degree of Doctor of Philosophy (PhD) in Management. This research is being supervised by Prof. Pia Arenius, Dr. Afreen Huq, and Dr. Meg Elkins. This research project has been approved by the RMIT Human Research Ethics Committee. The primary research question of this study is: "to what extent CFC program in Pakistan has contributed to the competitiveness of SMEs?" The study specifically looks at whether the use of CFC facilities & services improves production, innovation, export, and market competitiveness of SMEs in Pakistan. In addition this research explores that how SME's networking with external firms/institutions and capability to identify, acquire, integrate and exploit new knowledge helps them obtain higher competitiveness from the use of CFC program. This study is very important for policy makers, CFC management, and SMEs of Pakistan to gain research-based insights about the effectiveness of CFC program. Your cooperation in this regard is critical for the successful execution of this research project and to make Pakistan benefit from the research insights.

We require two responses from your organization. One response from the head of your organization, and 2nd response from person who is head of production or responsible for matters of support centre's matters. There are no perceived risks associated with participation in this research. Participation in this research is entirely voluntary and anonymous. You are under no obligation to participate in this survey and thus can refuse to participate or withdraw your participation at any stage of this survey. Your confidentiality and privacy will be maintained strictly and in highly professional manner. You and your firm will not be identifiable in the thesis report or data set. However, I would be able to provide generic results and brief copy of the report upon your request as soon as it is published. The thesis report and

subsequent publications will be based on aggregated results. The collected data will only be seen by the investigators. Any information that you will provide can be disclosed only if 1) it is to protect you or others from harm, 2) a court order is produced, or 3) you provide me with written permission. The data collected in this research will be kept securely at RMIT University for 5 years after publication before being destroyed. The final thesis will remain online. Because of the nature of your participation in this research, I am not obtaining a written consent from you. Instead, I am assuming that you have given your consent to participate in this survey by returning me the completed questionnaire.

If you have any queries regarding this research project, please contact me at 0333 4361678 or khuram.shahzad@rmit.edu.au. You may also contact any supervisors listed above through given emails. Any complaints about your participation in this research project can be directed to the Chair, Business College Human Ethics Advisory Network, College of Business, RMIT, Melbourne, Australia, phone +61 399 255 596, email: bchean@rmit.edu.au. Details of the complaint procedure are also available at http://rmit.net.au/browse;ID=2jqrnb7hnpyo.

I thank you for your time and cooperation.

Khuram Shahzad, PhD Candidate

School of Management, RMIT University, Melbourne, Australia

Contact: Email - khuram.shahzad@rmit.edu.au

The Survey Questionnaire

Project Title: Evaluating the Effect of 'Common Facility Centre Program' on SMEs' Competitiveness in Pakistan

Section -1: Profile of the Firm

Please provide the following information to the best of your knowledge by writing/ticking/circling the most relevant answer.

1) What is your position/designation in your firm? _____

2) What is the highest level of education of Chief Executive Officer (CEO) of this firm?

☐ Matric or Lower ☐ Intermediate (F.A/FSc etc.) ☐ Bachelor (B.A/BSc etc.)

☐ Master Degree (M.A/MSc etc.) ☐ Higher Degree (MPhil/PhD etc.) ☐ Any other _____

3) How much experience CEO of this company has in this industry? _____Year/s

4) What is the age group of CEO of this firm?

☐ Less than 25 years old ☐ 26 - 35 years old ☐ 36 – 45 years old

☐ 46 – 55 years old ☐ More than 55 years old

5) How long has your firm been in this business/industry?

☐ Less than a year ☐ 1-4 years ☐ 5-8 years ☐ 9-12 years

☐ More than 12 years

6) Is this firm owned and managed by the same person? ☐ Yes ☐ No

7) Is this firm a family business? ☐ Yes ☐ No

8) What is the ownership arrangement of this firm?

☐ Sole Proprietorship ☐ Partnership ☐ Private Limited

9) Is this firm/business being run/managed by the same person who established it?

Yes ☐ No ☐

10) Approximately how many people does your firm currently employee?

Full time employees:_____ Part time employees:_____

11) In which year did your firm 1st use facilities and services of _(Name of CFC Centre)_____Year

12) Is your firm availing any other government/industry support program?

☐ Yes ☐ No **(if No, please go to Q#. 15)**

13) In which year did your firm 1st use that support program? _____

14) What kind of facilities and services your firm has received from that support program? Please tick all that apply.

☐ Technological ☐ Financial ☐ Information ☐ Skills development

15) Has your firm received any loan or grant from government or other institutions?

Yes ☐ No ☐

16) Does your firm export products to other countries? ☐ Yes ☐ No **(If No, please go to Q #. 19)**

17) In which year did your firm make its 1st export? _____

18) What distribution channel does your firm use to sell its products to overseas customers? Please tick all relevant boxes.

☐ Local export trading house ☐ Foreign buyer's local representative in Pakistan

☐ Direct selling to foreign buyers ☐ Exporting through our sales representatives in foreign markets

19) Does your firm primarily sell its products to other firms or consumers?

☐ Almost exclusively to consumers ☐ Almost exclusively to other firms

Mixed ☐

20) What is the distance (in Kilometres) between your firm and this Common Facility Centre?

☐ Less than 2 KM ☐ 3 to 5 KM ☐ 6 to 10 KM ☐ More than 10 KM

21) With respect to resources (financial and non-financial) that your firm possess, how would you rate overall position of your firm in the industry during the past 3 years?

☐ Very weak ☐ Weak ☐ Mediocre ☐ Strong ☐ Very strong

22) During the past 3 years, has your firm expanded its production infrastructure?

Yes ☐ No ☐

23) What term below describes your firm's production equipment relative to the industry?

☐ Absolutely state-of-the-art

☐ Better than most of the companies in the industry

☐ About equal to the industry average

☐ Below the industry average

☐ Poor, near the bottom of the industry

24) How would your firm rank its manufacturing priorities? Rank as "1 to 5" where 1 is top priority and 5 is least priority. You cannot use the same ranking/number for two categories.

_____Flexibility for volume and product changes

_____Maintaining or lowering manufacturing cost

_____Keeping delivery promises

_____New product introduction

_____Improving or maintaining quality

25) Does your firm formally maintain production records such as unit cost, scrap rate, productivity (input-throughput-output ratios) etc. ☐ Yes ☐ No

Thank you very much for providing this information. Now please go to Section -2 on the next page.

Section -2

1) Use of ____(CFC Name)_____Facilities and Services

Please indicate the extent to which your firm has used the following facilities and services of this Common Facility Centre during the past 3 years.

Description of Facilities and Services	Never Used	Little Extent……..Large Extent						
1) Production facility of CFC	0	1	2	3	4	5	6	7
2) Laboratory services i.e. material testing and inspection services	0	1	2	3	4	5	6	7
3) Design, prototype, and development of new products facility	0	1	2	3	4	5	6	7
4) Technical training services (paid only)	0	1	2	3	4	5	6	7
5) Technical consultancy services (paid only)	0	1	2	3	4	5	6	7
6) Awareness seminars/events (about new technologies, production systems, products, markets etc.)	0	1	2	3	4	5	6	7
7) Technical and non-technical/management courses and diplomas	0	1	2	3	4	5	6	7
8) Export related information and services	0	1	2	3	4	5	6	7
9) Networking events (for relationship building with industry players and other stakeholders)	0	1	2	3	4	5	6	7

10) When did your firm use any of CFC's facility or service last time? Year_____ Month_____

2) Networking Capability

The following statements are about your firm's working relationships with various firms and institutions. *Working relationship means "sufficient friendly and cooperative relationship that allows your firm to perform its functions and activities efficiently and effectively".*

Please indicate your level of (dis)agreement with the following statements by using the given scale corresponding to each statement.

	Strongly Disagree			Neutral			Strongly Agree
	1	2	3	4	5	6	7
1) Our firm has good working relationships with our suppliers	1	2	3	4	5	6	7
2) Our firm has good working relationships with our customers	1	2	3	4	5	6	7
3) Our firm has good working relationships with our direct competitors	1	2	3	4	5	6	7
4) Our firm has good working relationships with universities/colleges/research-based institutions	1	2	3	4	5	6	7
5) Our firm has good working relationships with export promotion institutions (i.e. Export promotion bureau, Export centres etc.) (Deleted because half of sample SMEs do not export)	1	2	3	4	5	6	7

6) Our firm has good working relationship with banks and financial institutions (Deleted because majority of sample SMEs never took financial loan)	1	2	3	4	5	6	7
7) Our firm has good working relationship with industry associations/chamber of commerce	1	2	3	4	5	6	7
8) Our firm has good working relationship with Common Facility Centre's administration and management	1	2	3	4	5	6	7
9) Our firm has good working relationship with government officials or individuals who sit on government committees related to this industry	1	2	3	4	5	6	7
10) Our firm has good working relationship with production/manufacturing technology-based institutions	1	2	3	4	5	6	7

3) Absorptive Capacity

Please indicate your level of (dis)agreement with the following statements by using the given scale corresponding to each statement.

	Strongly……..... Strongly						
	Disagree			Neutral		Agree	
	1	2	3	4	5	6	7
1) Our firm is successful in learning new things. (to improve business practices and performance)	1	2	3	4	5	6	7
2) Our firm is effective in developing new knowledge or insights that have the potential to influence product/service development	1	2	3	4	5	6	7

3) Our firm is able to identify and acquire internal (e.g., within the firm) and external (e.g., market) knowledge	1	2	3	4	5	6	7
4) Our firm has effective routines to identify, value, and import new information and knowledge from channel partners	1	2	3	4	5	6	7
5) Our firm has adequate routines to analyse the information and knowledge obtained	1	2	3	4	5	6	7
6) Our firm has adequate routines to assimilate new information and knowledge	1	2	3	4	5	6	7
7) Our firm can successfully integrate our existing knowledge with the new information and knowledge acquired	1	2	3	4	5	6	7
8) Our firm is effective in transforming existing information into new knowledge	1	2	3	4	5	6	7
9) Our firm can successfully grasp new opportunities from new external knowledge	1	2	3	4	5	6	7
10) Our firm can successfully exploit the new integrated information and knowledge into concrete applications	1	2	3	4	5	6	7
11) Our firm is effective in utilizing knowledge into new products	1	2	3	4	5	6	7
12) Our firm constantly considers better ways to exploit knowledge	1	2	3	4	5	6	7

4) Innovation Competitiveness

Please indicate your level of (dis)agreement with the following statements by using the given scale corresponding to each statement.

Statements	Strongly……..... Disagree		Neutral			Strongly Agree	
	1	2	3	4	5	6	7
1) In comparison with competitors during the past 3 years, our firm has introduced more new or significantly improved products and services	1	2	3	4	5	6	7
2) In comparison with competitors during the past 3 years, our firm has introduced more new or significantly improved processes of manufacturing or producing goods or services	1	2	3	4	5	6	7
3) In comparison with competitors during the past 3 years, our firm has incorporated more advanced production equipment and technologies	1	2	3	4	5	6	7
4) In comparison with competitors during the past 3 years, our firm has been perceived more innovative in the industry	1	2	3	4	5	6	7

5) Production Competitiveness

What is your level of understanding about the production practices and performance of your competitor firms? **Very Poor** 1…..2…..3…..4…..5…..6…..7 **Very Good**

Please indicate your level of (dis)agreement with the following statements by using the given scale corresponding to each statement.

Statements	Strongly……..... Strongly Disagree 1	2	3	Neutral 4	5	Agree 6	7
1) During the past 3 years, overall production cost of our firm has been lower than our competitors	1	2	3	4	5	6	7
2) During the past 3 years, production wastage or scrap rate of our firm has been lower than our competitors	1	2	3	4	5	6	7
3) During the past 3 years, on time-in full-delivery performance of our firm has been better than our competitors	1	2	3	4	5	6	7
4) During the past 3 years, our firm's investment in production infrastructure and technologies has been better than our competitors	1	2	3	4	5	6	7
5) During the past 3 years, production time or manufacturing throughput time of our firm has been better than our competitors	1	2	3	4	5	6	7
6) During the past 3 years, overall production function i.e. production processes, volume, schedules etc. of our firm has been more flexible than our competitors	1	2	3	4	5	6	7
7) During the past 3 years, delivery speed of our firm has been better than our competitors	1	2	3	4	5	6	7

8) During the past 3 years, production lead time of our firm has been better than our competitors	1	2	3	4	5	6	7
9) During the past 3 years, overall product quality (i.e. reliability, durability, conformance to specs etc.) of our firm has been better than our competitors	1	2	3	4	5	6	7
10) During the past 3 years, product development cycle time of our firm has been better than our competitors	1	2	3	4	5	6	7
11) During the past 3 years, value-addition in our firm has been better than our competitors	1	2	3	4	5	6	7
12) During the past 3 years, production equipment and technologies of our firm have been better than our competitors	1	2	3	4	5	6	7
13) During the past 3 years, level of production automation of our firm has been better than our competitors	1	2	3	4	5	6	7
14) During the past 3 years, quality control system of our firm has been better than our competitors	1	2	3	4	5	6	7
15) During the past 3 years, overall manufacturing performance of our firm has been better than our competitors	1	2	3	4	5	6	7

6) Internationalisation Competitiveness

Please indicate your level of (dis)agreement with the following statements by using the given scale corresponding to each statement.

Strongly…….....					Strongly	
Disagree			Neutral		Agree	
1	2	3	4	5	6	7

1) In comparison with competitors during the past 3 years, our firm has entered into more new foreign markets	1	2	3	4	5	6	7
2) In comparison with competitors during the past 3 years, our firm's export sales volume has increased more	1	2	3	4	5	6	7
3) In comparison with competitors during the past 3 years, our firm has achieved higher positive growth in exports sales	1	2	3	4	5	6	7
4) In comparison with competitors during the past 3 years, our firm's profitability from exports has increased more	1	2	3	4	5	6	7
5) In comparison with competitors during the past 3 years, our firm's exports contribution in total sale has increased more	1	2	3	4	5	6	7
6) In comparison with competitors during the past 3 years, our firm's profit from export sales is higher than profit from domestic sales	1	2	3	4	5	6	7
7) In comparison with competitors during the past 3 years, our firm's overall export performance has been better	1	2	3	4	5	6	7

7) Market Competitiveness

Please indicate your level of (dis)agreement with the following statements by using the given scale corresponding to each statement.

	Strongly…….....				Strongly		
	Disagree			Neutral		Agree	
Statements	1	2	3	4	5	6	7

1) During the past 3 years, Sales growth rate of our firm has been better than our competitors	1	2	3	4	5	6	7
2) During the past 3 years, market share growth rate of our firm has been better than our competitors	1	2	3	4	5	6	7
3) During the past 3 years, profitability of our firm has been better than our competitors	1	2	3	4	5	6	7
4) During the past 3 years, return on investment (ROI) of our firm has been better than our competitors	1	2	3	4	5	6	7
5) During the past 3 years, overall productivity of our firm has been better than our competitors	1	2	3	4	5	6	7
6) During the past 3 years, overall competitive position of our firm has been better than our competitors	1	2	3	4	5	6	7

Would you like to receive findings/results of this research? ☐ Yes ☐ No

(if yes, please provide the following contact information)

Email Address written in Capital Words:_____

Phone #. _____

Name and address:_____

Can I contact you again to seek any further information in the future? ☐ Yes ☐ No

Thank you very much for your time and cooperation.

APPENDIX 3: TRANSLATED INSTRUMENT (URDU VERSION)

تحقیقی پروجیکٹ میں شرکت کا دعوت نامہ

Invitation to Participate in Research Project

شرکا ء کے لیے معلوماتی بیانیہ

Participants Information Statement

پروجیکٹ کا عنوان(**Project Title**) : پاکستان میں کامن فیسیلیٹی سنٹر پروگرام(Common Facility Centre Program) کاچھوٹے اور درمیانے درجے کے کاروباری اداروں (SMEs)کی باہمی مسابقت (Competitiveness)پراثرات کا جائزہ

محققین (Investigators)

1. خرم شہزاد(Khuram Shahzad)(پی ایچ ڈی (PhD) سکالر* (khuram.shahzad@rmit.edu.au)
2. پروفیسر پیا ارینئیس(Prof. Pia Arenius) (ریسرچ سپروائزر(pia.arenius@rmit.edu.au)*
3. ڈاکٹر آفرین حق(Dr. Afreen Huq)(ریسرچ سپروائزر(afreen.huq@rmit.edu.au) *
4. ڈاکٹر میگ الکنز(Dr. Meg Elkins)(ریسرچ سپروائزر(meg.elkins@rmit.edu.au) *

*کالج آف بزنس(College of Business)،RMITیونیورسٹی(RMIT University)، میلبورن(Melbourne) ، آسٹریلیاء(Australia)

محترم جناب چیف ایگزیکٹو آفیسر(**CEO**)

آپ سے اس سروے میں شرکت کی گزارش ہےجس کا مقصد اس بات کی تحقیق کرنا ہے کہ حکومت پاکستان کےکامن فیسیلیٹی سنٹر پروگرام نے پاکستان میں چھوٹے اور درمیانے درجے کے کاروباری اداروں (SMEs)کی مسابقت (Competitiveness) میں بہتری لانے کے لیےکیا کردار ادا کیا ہے ۔اس مقصد کے حصول کے لیےکامن فیسیلیٹی سنٹر (Common Facility Centre)کی سہولیات اورخدمات کے استعمال اورSMEs کی مسابقت کے مختلف پہلووں سےمتعلق معلومات درکار ہیں۔ یہ معلومات ان SMEs کے چیف ایگزیکٹو آفیسر(CEO)سے درکار ہیں جو اس پروگرام کی سہولیات اورخدمات سے مستفید ہو رہے ہیں۔آپ سے اس لیے رابطہ کیا جا رہا ہے کہ آپ کی فرم حکومت پاکستان کے ایک ایسے ہی کامن فیسیلیٹی سنٹر (CFC)، جس کا نام _____ ہے، کی سہولیات اور خدمات سے مستفید ہورہی ہے۔ اس خط میں اس تحقیقی پروجیکٹ کو سادہ اور صاف زبان میں بیان کیا گیا ہے۔ برائے مہربانی اس سروے میں شرکت کی ہماری اس درخواست کو قبول کرنے سے قبل خط کےمندرجات کو احتیاط سے پڑھ لیں ۔

میرا نام خرم شہزاد ہے ، میں آر ایم آئی ٹی (RMIT) یونیورسٹی میلبورن ، آسٹریلیا سے منیجمنٹ میں پی ایچ ڈی (PhD Management) کر رہا ہوں۔یہ تحقیق میری پی ایچ ڈی (PhD)کی تکمیل کی بنیادی اکائی ہے۔ اس تحقیق کے نگران پروفیسر پیا ارینئیس (Prof. Pia Arenius)، ڈاکٹر آفرین حق (Dr. Afreen Huq) اور ڈاکٹر میگ ایلکنز (Dr. Meg Elkins) ہیں۔ اس تحقیقی پروجیکٹ کو RMITیونیورسٹی کی ہیومن ریسرچ ایتھکس کمیٹی (Human Research Ethics Committee) کی منظوری حاصل ہے۔ اس تحقیق کا بنیادی سوال یہ ہے کہ’پاکستان کےکامن فیسیلیٹی سنٹر پروگرام (Common Facility Centre Program)نے SMEs کی مسابقتی صلاحیت (Competitiveness)کو بڑھانے میں کس حدتک اپنا کردار ادا کیا ہے؟‘یہ تحقیق خصوصی طور پر یہ دیکھنا چاہتی ہے کہ آیا پاکستان میں کامن فیسیلیٹی سنٹر (CFC)کی سہولیات اور خدمات استعمال کرنے والے SMEs کی پیداوار ی (Manufacturing)، اختراعی/جدتی (Innovation)، برآمدات (Export)

اور مارکیٹ سے متعلقہ مسابقتی صلاحیت (Market competitiveness) میں کتنی بہتری آئی ہے۔ مزید برآں یہ تحقیق اس بات کا بھی پتا چلائے گی کہSMEsکی بیرونی فرموں/ اداروں سے رابطہ کاری (Networking) اور نئی معلومات کی شناخت، حصول،استعمال اورفائدہ اُٹھانے کی صلاحیت نے ان کیCFCپروگرام کو استعمال کرتے ہوئے اعلی مسابقتی صلاحیت کے حصول میں کیسے مدد کی ہے۔یہ تحقیق، حکومتی پالیسی سازوں (Policy Makers)، کامن فیسیلیٹی سنٹر(CFC) کی انتظامیہ اور پاکستان کےSMEs کے لیے بہت اہم ہے کیونکہ وہ اس سےCFC پروگرام کے مئوثر ہونے کے حوالے سے تحقیق پر مبنی بصیرت(Insights) حاصل کر سکتے ہیں۔ آپ کا اس سروے میں تعاون اس تحقیقی پروجیکٹ کی کامیابی اور پاکستان کے لیےاس تحقیق کی بصیرت سے فائدہ اُٹھانے کے لیے بہت ہی اہم ہے۔

اس تحقیق میں شمولیت کی صورت میں آپ کے لیے کوئی مسلئہ یا پریشانی نہیں ہو گی۔ کیونکہ اس تحقیق میں آپ کی شرکت مکمل طور پر رضاکارانہ اور بےنام ہوگی۔ اس سروے میں شرکت آپ کی مجبوری نہیں ہے اس لیے اگر آپ چاہیں تو ابھی یا کسی بھی مرحلے پر اس میں شرکت سے معذرت کر سکتے ہیں ۔ آپ کی پرائیویسی ہر صورت میں اور پیشہ وارانہ انداز میں یقینی بنائی جائے گی اور معلومات صیغہ راز میں رکھی جائیں گی۔ میرےپی ایچ ڈی(PhD) کےتھیسس (Thesis) کی رپورٹ یا ڈیٹا سیٹ میں آپ یا آپ کی فرم کی شناخت نہیں ہو سکے گی۔ تاہم اگر آپ چاہیں گےتو میں آپ کو اس سروے کےعمومی نتائج اور رپورٹ کے اختصاریہ (Brief) کی کاپی (Copy) اس کی اشاعت کے بعد مہیا کر سکتا ہوں۔میرےپی ایچ ڈی (PhD) کےتھیسس(Thesis) کی رپورٹ اور اس کے بعد کی اشاعتیں (Publications) اس سروے کے مجموعی نتائج کی بنیاد پر تیار ہوں گی۔ اس سروے کا جمع شدہ مواد(Data) صرف اس سروے کی نگرانی کرنے والے (Supervisors)اورمحققین (Researchers)ہی دیکھ سکیں گے۔ آپ جو بھی معلومات مہیا کریں گے اس کا کوئی بھی حصہ صرف اس صورت ظاہر کیا جا سکتا ہے اگر، 1) اس کا مقصدآپ کو یا کسی اور کو کسی نقصان سے بچانا ہو۔ 2) عدالت کا حکم ہویا 3) اگر آپ مجھے تحریری اجازت دے دیں۔ جمع شدہ مواد (Data) اشاعت کے پانچ سال بعد تک RMIT یونیورسٹی میں محفوظ رکھا جائے گا اور اس کے بعد یہ مواد مکمل طور پر ختم کر کر دیا جائے گا۔ بہر حال فائنل تھیسس (Thesis) آن لائن موجود رہے گا۔ اس تحقیق میں آپ کی شراکت

کی نوعیت کو سامنے رکھتے ہوئے میں آپ سے تحریری رضامندی نہیں لے رہا۔ بلکہ میں یہ فرض کررہا ہوں کہ اگر آپ مجھے یہ سوالنامہ مکمل کر کے واپس بھیجتے ہیں تو یہ آپ کی طرف سےاس سروے میں شرکت کے لیے رضامندی ہے۔

اگر آپ اس تحقیقی پروجیکٹ کے حوالے سے کچھ بھی پوچھنا یا جاننا چاہتے ہیں تو برائے مہربانی khuram.shahzad@rmit.edu.au پر یا 03334361678 **پر خرم شہزادسے رابطہ کر سکتے ہیں**۔ اس کے علاوہ آپ کسی نگران(Supervisor) سے بھی اوپر دی گئی ای میلز کے ذریعے سے رابطہ کر سکتے ہیں۔ اس تحقیقی پروجیکٹ میں آپ کی شرکت سے متعلق کسی قسم کی شکایات کو سربراہ(Chair)، بزنس کالج ہیومن ایتھکس ایڈوائزری نیٹورک (Business College Human Ethics Advisory Network)، کالج آف بزنس (College of Business) ، RMIT، میلبورن، آسٹریلیا کے نام بھی بھیجا جا سکتا ہے، فون : 596 255 399 61+, ای میل bchean@rmit.edu.au۔شکایات سے متعلق مکمل طریقہ کار کی تفاصیل یہاں بھی دستیاب ہیں:http://rmit.net.au/browse;ID=2jqrnb7hnpyo .

میں آپ کے وقت اور تعاون کا انتہائی مشکور ہوں

خرم شہزاد، امیدوار برائے پی ایچ ڈیمنیجمنٹ (PhD Management)

سکول آف منیجمنٹ(School of Management)، RMITیونیورسٹی، میلبورن، آسٹریلیا

سروے سوالنامہ

The Survey Questionnaire

پروجیکٹ کا عنوان(**Project Title**) : پاکستان میں کامن فیسیلیٹی سنٹر پروگرام(Common Facility Centre Program) کاچھوٹے اور درمیانے درجے کے کاروباری اداروں (SMEs)کی باہمی مسابقت (Competitiveness)پر اثرات کا جائزہ

سیکشن1: فرم کی پروفائل (Profile of the Firm)

براہ مہربانی اپنی بہترین معلومات کی بنیاد پرمندرجہ ذیل سوالات کے جوابات فراہم کریں ۔موزوں ترین جواب لکھیے/ ٹک لگائیے/دائرہ لگا ئیے۔

1) آپ کی فرم میں آپ کا عہدہ کیا ہے؟_____

2) اس فرم کے چیف ایگزیکٹو آفیسر(CEO) کی زیادہ سے زیادہ تعلیمی قابلیت کیا ہے؟

☐ میٹرک یا اس سے کم ☐ انٹر میڈیٹ(F.A/FSc etc) ☐

بیچلر(B.A/BSc etc) ☐

ماسٹر ڈگری(M.A/MSc etc) ☐ ہائر ڈگری(MPhil/PhD etc) ☐

یا کوئی اور

3) اس فرم کے سی ای او (CEO)کا اس انڈسٹری(Industry)میں تجربہ کتنا ہے؟

_____سال

4) اس فرم کےسی ای او (CEO) کی عمر کانیچے دیئے گئےکس گروپ سے تعلق ہے؟

☐ 25سال سے کم☐ 26سے35سال کے درمیان 36☐

سے45سال کے درمیان

☐ 46سے55سال کے درمیان 55☐ سال سے زیادہ عمر

5) آپ کی فرم اس بزنس یا انڈسٹری(Industry) میں کتنے عرصے سے ہے؟

☐ ایک سال سے کم 1 ☐ سے4سال 5☐ سے 8 سال 9 ☐

سے12سال 12☐ سال سے زیادہ

6) کیا اس فرم کا مالک (Owner)اور فرم کے معاملات کو چلانے والا شخص ایک ہی

ہے؟ ☐ ہاں ☐ نہیں

7) کیا یہ فرم ایک خاندانی کاروبار(Family Business) ہے؟ ☐ ہاں

☐ نہیں

8) اس فرم کی ملکیت کا نظام کیا ہے؟

☐ انفرادی ملکیت ☐ (Sole Proprietorship) شراکت داری ☐ (Partnership)

پرائیویٹ لمیٹڈ(Private Limited)

9) کیا اس فرم / بزنس کاانتظام وہی شخص دیکھ رہا ہے جس نے اسے قائم کیا تھا؟ ☐

ہاں ☐ نہیں

10) اس وقت آپ کی فرم میں اندازاً کتنے ملازمین کام کر رہے ہیں؟

کل وقتی ملازمین(Full time employees) :_____ جزوقتی ملازمین (Part

time employees):_____

11) آپ کی فرم نے پہلی

بار_____

_____کی سہولیات و خدمات کس سال میں استعمال کی تھیں؟

سال_____؟

12) کیا آپ کی فرم اس کے علاوہ کسی اور حکومتی یا انڈسٹری سپورٹ پروگرام (Support program)سے بھی فائدہ اُٹھا /اُٹھاتی رہی ہے؟

☐ ہاں ☐ نہیں **(اگر نہیں تو براہ مہربانی سوال نمبر15دیکھیں)**

13) آپ کی فرم نے پہلی بار اُس سپورٹ پروگرام(Support Program) کوکس سال استعمال کیا تھا؟_____

14) اُس سپورٹ پروگرام سے آپ کی فرم نے کس قسم کی سہولیات و خدمات حاصل کیں؟ براہ مہربانی جو بھی متعلقہ ہیں اس پرٹک لگائیں۔

☐ تکنیکی ☐ مالیاتی ☐ معلوماتی ☐ فنی مہارتوں میں بہتری(Skills Development)

15) کیا آپ کی فرم نے حکومت یا کسی اور ادارے سے کبھی کوئی قرض یا گرانٹ وصول کی ہے؟

☐ ہاں ☐ نہیں

16) کیا آپ کی فرم دیگر ممالک میں اپنی مصنوعات برآمد (Export) کرتی ہے؟

☐ ہاں ☐ نہیں**(اگر نہیں تو براہ مہربانی سوال نمبر19دیکھیں)**

17) آپ کی فرم نے پہلی بار برآمدات (Export) کس سال کی تھیں؟_____

18) آپ کی فرم بیرون ملک گاہکوں کو اپنی اشیا ءفروخت کرنے کے لیے ڈسٹری بیوشن (Distribution) کے کونسے ذرائع استعمال کرتی ہے؟ براہ مہربانی تمام متعلقہ خانوں کو ٹک کریں۔

☐ مقامی ایکسپورٹ ٹریڈنگ ہاؤس (Local export trading house)

☐ بیرونی خریداروں کے پاکستان میں مقامی نمائندے (Foreign buyer's local representative in Pakistan)

☐ بیرونی خریداروں کو براہ راست فروخت (Direct selling to foreign buyers)

☐ بیرونی منڈیوں میں ہمارے سیلز نمائندوں کے ذریعے برآمدکرنا (Exporting through our sales representatives in foreign markets)

19) کیا آپ کی فرم بنیادی طور پر اپنی مصنوعات (Products) دیگر فرموں یا صارفین کو فروخت کرتی ہے؟

☐ صرف صارفین کو ☐ صرف دیگر فرموں کو ☐ دونوں کو

20) آپ کی فرم اور اس کامن فیسیلیٹی سنٹر (Common Facility Centre) کے مابین کتنا فاصلہ (کلومیٹروں میں) ہے؟

☐2کلو میٹر سے کم ☐3 سے 5کلومیٹر ☐6سے 10کلومیٹر

☐10کلومیٹرسے زیادہ

21) وسائل (مالی و غیرمالی) کے حوالے سے (جوآپ کی فرم کی ملکیت میں ہیں) آپ گذشتہ تین سالوں میں اس انڈسٹری میں اپنی فرم کو کس درجے پر شمار کرتے ہیں۔

☐ بہت کمزور ☐ کمزور ☐ اوسط ☐ مستحکم

☐ بہت مستحکم

22) گذشتہ تین سال کے دوران کیا آپ کی فرم نے اپنے پیداواری ڈھانچے (Production infrastructure) میں توسیع کی ہے؟

☐ ہاں ☐ نہیں

23) نیچے دی گئی کون سی اصطلاح (Term) انڈسٹری کی مناسبت سے آپ کی فرم کی پیداواری آلات (Production Equipment) کوبہتر بیان کرتی ہے؟

☐ مکمل طور پر جدید آلات

☐ اس انڈسٹری کی اکثر کمپنیوں سے بہترآلات

☐ انڈسٹری کی اوسط حالت کے مطابق آلات

☐ انڈسٹری کی اوسط حالت سے کم تر آلات

☐ بری حالت، اس انڈسٹری کی سب سے نچلی سطح آلات

24) آپ کی فرم نیچے دی گئی5 پیداواری ترجیحات(Production priorities) کی درجہ بندی کیسے کرتی ہے ؟1سے 5کے درجے میں بتائیں جہاں 1اولین ترجیح ہے اور 5آخری ترجیح۔ آپ دوترجیحات کے لیے ایک ہی درجہ/عدداستعمال نہیں کر سکتے۔

____ مصنوعات کیےحجم اور تبدیلی کے لیے لچک پذیر ہونا Flexibility for volume and product changes

____پیداواری لاگت کو کم کرنا یا برقرار رکھنا Maintaining or lowering manufacturing cost

____اشیاء کی فراہمی کے وعدوں کی پاسداری Keeping delivery promises

____نئی مصنوعات کومتعارف کروانا New product introduction

____معیار کو برقرار رکھنا یا بہتر بنانا Improving or maintaining quality

25) کیا آپ کی فرم باقاعدہ طور پر اپنی پیدوارکا متعلقہ ریکارڈ رکھتی ہے جیسا کہ فی یونٹ لاگت (Unit Cost)، سکریپ ریٹ کی شرح (Scrap Rate)، پیداواریت کی شرح (خام مال (Input) ۔ تیاری کا دورانیہ (Throughput) ۔ تیار مصنوعات (Output) وغیرہ)

☐ ہاں ☐ نہیں

ان معلومات کی فراہمی کے لیے بہت شکریہ۔ براہ مہربانی اب اگلے صفحے پر موجود سیکشن 2کی طرف جائیں

سیکشن 2

1. _____ کی سہولیات و خدمات کا استعمال۔

Use of _____ Facilities and Services

براہ مہربانی ہر بیان کے سامنے دیے گئے پیمانےکواستعمال کرتےہوئے یہ بتائیں کہ گذشتہ تین سال کے دوران آپ کی فرم نے اس‌کامن فیسیلیٹی سنٹر (Common Facility Centre)کی مندرجہ ذیل سہولیات و خدمات کو کس حد تک استعمال کیا ہے۔

سہولیات و خدمات کی تفصیل	کبھی استعمال نہیں کی	بہت زیادہ_____ بہت کم						
1. CFCکی پیداواری سہولت(Production Facility)	0	1	2	3	4	5	6	7
2. لیبارٹری خدمات جیسے مال/مواد کی جانچ اور معائنہ کی خدمات	0	1	2	3	4	5	6	7
3. نئی مصنوعات (Products) کےڈیزائن(Design)اورابتدائی نمونہ جات(Prototype)کی تیاری کی سہولت	0	1	2	3	4	5	6	7
4. تکنیکی تربیتی خدمات(Technical Training Services)(صرف ادائیگی پر)	0	1	2	3	4	5	6	7
5. تکنیکی مشاورتی خدمات(Technical Consultancy Services)(صرف ادائیگی پر)	0	1	2	3	4	5	6	7
6. نئی ٹیکنالوجیز(Technologies)، پیداواری نظام (Production Systems)، مصنوعات (Products) اور مارکیٹس (Markets)سے متعلق آگاہی سیمینارزاورتقریبات	0	1	2	3	4	5	6	7

7. تکنیکی، غیر تکنیکی ، انتظامی کورسزاور ڈپلومے (Technical, Non-Technical, Management Courses and Diplomas) 0 7 6 5 4 3 2 1

8. برآمدات(Export)سے متعلق معلومات اورخدمات 0 7 6 5 4 3 2 1

9. انڈسٹری(Industry)کے اہم افراد اور دیگر فریقین سے تعلقات کی تعمیرسے متعلق رابطہ کاری (Networking)کےسیمینارزاورتقریبات 0 7 6 5 4 3 2 1

10. آپ کی فرم نے آخری بار اس کامن فیسیلیٹی سنٹر(CFC) کی سہولیات و خدمات کب استعمال کی ہیں؟

مہینہ :_____

سال: _____

2. CFCکی سہولیات و خدمات کے استعمال کے حوالے سے تیاری

Readiness for the Use of CFC's Facilities and Services

براہ مہربانی مندرجہ ذیل بیانات کےسامنے دیئے گئےپیمانےکواستعمال کرتے ہوئے ہربیان کے متعلق اپنا اتفاق یا عدم اتفاق بتائیں۔

بیانیے مکمل اتفاق _____مکمل عدم اتفاق

غیر جانبدار

1 2 3 4 5 6 7

1. ہماری فرم اپنی مسابقتی کارکردگی(Competitive Performance)کو بڑھانے کے لیے کامن فیسیلیٹی سنٹر (CFC) کو ایک انتہائی اہم اور سٹریٹیجک ذریعہ (Strategic Resource) سمجھتی ہے 1 2 3 4 5 6 7

2. ہماری فرم کامن فیسیلیٹی سنٹر (CFC) کی سہولیات و خدمات کو استعمال کرنے، اپنانے اور فرم میں عمل درآمد کرنےکی مکمل حامی ہے	1	2	3	4	5	6	7
3. ہماری فرم نے کامن فیسیلیٹی سنٹر (CFC) کی سہولیات اور خدمات کے استعمال کے لیے علیحدہ سے مالی (Finance) اور شخصی (Human Resource)وسائل مختص کیے ہوئے ہیں۔	1	2	3	4	5	6	7
4. ہماری فرم نے ایسا اندرونی نظام اور طریقہ کار تشکیل دیا ہوا ہے جو اس بات کو یقینی بناتا ہے کہ کامن فیسیلیٹی سنٹر (CFC)کی سہولیات و خدمات کے استعمال سے ہر ممکن اور زیادہ سے زیادہ فائدہ حاصل کیا جا سکے۔	1	2	3	4	5	6	7
5. ہماری فرم کامن فیسیلیٹی سنٹر (CFC)کی سہولیات و خدمات کے استعمال کے ضمن میں متعلقہ سرمایہ کاری کا ہر خطرہ (Investment Risk)مول لینے کوتیار ہے	1	2	3	4	5	6	7

3. رابطہ کاری کی صلاحیت Networking Capability

ذیل میں دیے گئے بیانیے آپ کی فرم کی دوسری فرموں اور اداروں سے فعال تعلقات سے متعلق ہیں۔ فعال تعلقات سے مراد'' دوستانہ ، باہمی تعلق پر مبنی اورفائدہ مند تعلقات ہیں جو آپ کی فرم کو بہتر اور مئوثر انداز میں اپنی کاروباری سرگرمیاں سر انجام دینے میں مددگار ثابت ہوتے ہیں'' براہ مہربانی مندرجہ ذیل بیانات کےسامنے دیئے گئےپیمانےکواستعمال کرتے ہوئے ہربیان کے متعلق اپنا اتفاق یا عدم اتفاق بتائیں۔

بیانیے	مکمل اتفاق _____مکمل عدم اتفاق						
	غیر جانبدار						
	1	2	3	4	5	6	7

1. ہماری فرم کےاپنےمال فراہم کرنےوالے سپلائرز(Suppliers)کےساتھ اچھے اورفعال تعلقات ہیں	1	2	3	4	5	6	7
2. ہماری فرم کےاپنےصارفین(Customers)کےساتھ اچھےاورفعال تعلقات ہیں	1	2	3	4	5	6	7
3. ہماری فرم کےاپنے مدمقابل اداروں(Competitors) کےساتھ اچھےاورفعال تعلقات ہیں	1	2	3	4	5	6	7
4. ہماری فرم کےجامعات(Universities)،کالجوں(Colleges)اورتحقیقی اداروں(Research-Based Institutions)کےساتھ اچھےاورفعال تعلقات ہیں	1	2	3	4	5	6	7
5. ہماری فرم کےبرآمدات کو فروغ دینے والے حکومتی اداروں (Export Promotion Institutions) کےساتھ اچھےاورفعال تعلقات ہیں	1	2	3	4	5	6	7
6. ہماری فرم کےبنکوناورمالیاتی اداروں(Banks and Financial Institutions) کےساتھ اچھے اورفعال تعلقات ہیں	1	2	3	4	5	6	7
7. ہماری فرم کےانڈسٹری ایسوسی ایشنز/چیمبرآف کامرس (Industry Associations/Chamber of Commerce)کےساتھ اچھے اورفعال تعلقات ہیں	1	2	3	4	5	6	7
8. ہماری فرم کےکامن فیسیلیٹی سنٹر(CFC) کی انتظامیہ کےساتھ اچھےاورفعال تعلقات ہیں	1	2	3	4	5	6	7
9. ہماری فرم کےحکومتی حکام اوران افرادسےاچھےاورفعال تعلقات ہیں جواس انڈسٹری سےمتعلق فیصلہ لینے والی کمیٹیوں کےرکن ہیں	1	2	3	4	5	6	7
10. ہماری فرم کے پروڈکشن / مینو فیکچرنگ /(Production Manufacturing) کی ٹیکنالوجی سےوابستہ اداروں کےساتھ اچھےاور فعال تعلقات ہیں	1	2	3	4	5	6	7

4. نئی معلومات جذب اور استعمال کرنے کی صلاحیت Absorptive Capacity

براہ مہربانی مندرجہ ذیل بیانات کےسامنے دیئے گئےپیمانےکواستعمال کرتے ہوئے ہربیان کے متعلق اپنا اتفاق یا عدم اتفاق بتائیں۔

بیانیے	مکمل اتفاق _____مکمل عدم اتفاق غیر جانبدار						
	1	2	3	4	5	6	7
1. ہماری فرم ایسی نئی چیزینسیکھنے میں کامیاب ہے جو ہمارے کاروباری طریقوں اورکارکردگی کوبہترکرنےکےلیےضروری ہے	1	2	3	4	5	6	7
2. ہماری فرم مصنوعات /خدمات(Products/Services)پر اثرانداز ہونے والےعلم اوربصیرت(Insights)کوفروغ دینے میں کافی مئوثرہے ۔	1	2	3	4	5	6	7
3. ہماری فرم اندرونی(مثلا فرم کے اندر)اور بیرونی (جیسے مارکیٹ)علوم کو شناخت کرنے اور حاصل کرنے کی قابلیت رکھتی ہے	1	2	3	4	5	6	7
4. ہماری فرم میں اپنے چینل پارٹنرز (Channel Partners) سےنئی معلومات/علم کی شناخت،قدراورحصول کامئوثرنظام موجود ہے۔	1	2	3	4	5	6	7
5. ہماری فرم میں حاصل شدہ معلومات/علم کاتجزیہ کرنےکامناسب طریقہ کار موجود ہے	1	2	3	4	5	6	7
6. ہماری فرم نئےعلوم /معلومات کو اپنے اندرجذب کرنےکامناسب نظام رکھتی ہے	1	2	3	4	5	6	7
7. ہماری فرم کامیابی کےساتھ نئی حاصل شدہ معلومات/علم کو پہلے سے موجودعلم میں ضم کرنے کی صلاحیت رکھتی ہے	1	2	3	4	5	6	7
8. ہماری فرم موجودمعلومات کونئےعلم میں ڈھالنےکےحوالےسےمئوثرہے	1	2	3	4	5	6	7

9. ہماری فرم مارکیٹ میں حاصل کردہ معلومات سےنئے مواقعے ڈھونڈنے اور ان سے فائدہ اُٹھانے میں مئوثر ہے	1	2	3	4	5	6	7
10. ہماری فرم نئے ضم شدہ علم/ معلومات (Integrated Information and knowledge) کو استعمال کرتے ہوئےکامیابی کے ساتھ نئے اور ٹھوس طریقہ کار وضع کر سکتی ہے	1	2	3	4	5	6	7
11. ہماری فرم اپنے علم /معلومات کو استعمال کرکےنئی مصنوعات (Products) بنانے میں مئوثرہے	1	2	3	4	5	6	7
12. ہماری فرم علوم کو استعمال میں لانےکےبہترطریقوں پرمسلسل غورکرتی رہتی ہے	1	2	3	4	5	6	7

5. جدتی مسابقت Innovation Competitiveness

براہ مہربانی مندرجہ ذیل بیانات کےسامنے دیئے گئےپیمانےکواستعمال کرتے ہوئے ہربیان کے متعلق اپنا اتفاق یا عدم اتفاق بتائیں۔

بیانیے	مکمل اتفاق _____مکمل عدم اتفاق غیر جانبدار						
	1	2	3	4	5	6	7
1. گزشتہ تین سال کےدوران مدمقابل فرموں(Competitors) کےمقابلےمیں ہماری فرم نےزیادہ نئی یا نمایاں طور پر بہتر کی گئی مصنوعات / خدمات (Services/Products)متعارف کروائی ہیں	1	2	3	4	5	6	7
2. گزشتہ تین سال کےدوران مدمقابل فرموں کےمقابلے میں ہماری فرم نےزیادہ نئے یا نمایاں طور پر بہتر کیےگئےپیداوار (Manufacturing)) یا مصنوعات /خدمات Producing goods (Services /)کےطریقہ کار متعارف کروائےہیں۔	1	2	3	4	5	6	7

3. گزشتہ تین سال کے دوران مدمقابل فرموں کےمقابلےمیں ہماری فرم نے زیادہ جدید آلات پیداوار اور ٹیکنالوجی (Manufacturing Equipment and Technologies)حاصل کی ہے

1 2 3 4 5 6 7

4. گزشتہ تین سال کےدوران مدمقابل فرموں کے مقابلے میں ہماری فرم کو اس انڈسٹری میں زیادہ جدت پسند(Innovative) فرم سمجھاجاتاہے۔

1 2 3 4 5 6 7

6. پیداواری مسابقت Production Competitiveness

آپ اپنے مدمقابل فرموں کی مجموعی کارکردگی اور پیداواری(Production)طریقہ کار کو کس حد تک سمجھتے ہیں

بہت اچھا7.....6.....5.....4.....3.....2.....1بہت برا

براہ مہربانی مندرجہ ذیل بیانات کےسامنے دیئے گئےپیمانےکواستعمال کرتے ہوئے ہربیان کے متعلق اپنا اتفاق یا عدم اتفاق بتائیں۔

بیانیے مکمل اتفاق _____مکمل عدم اتفاق

غیر جانبدار

1 2 3 4 5 6 7

1. گزشتہ تین سال کےدوران ہماری فرم کی مجموعی پیداواری لاگت (Overall Production Cost)ہماری مدمقابل فرموں (Competitors) سےکم رہی ہے

1 2 3 4 5 6 7

2. گزشتہ تین سال کےدوران ہماری فرم کاپیداواری ضیاع (Production Wastage) یا اسکریپ ریٹ(Scrap Rate)ہماری مدمقابل فرموں سےکم رہاہے

1 2 3 4 5 6 7

3. گزشتہ تین سال کےدوران ہماری فرم کی بروقت اور مکمل فراہمی کی کارکردگی ہماری مدمقابل فرمونسےبہتررہی ہے

1 2 3 4 5 6 7

4. گزشتہ تین سال کےدوران ہماری فرم کی پروڈکشن/ مینو فیکچرنگ (Production/Manufacturing)کے بنیادی ڈھانچےاورٹیکنالوجیز (Infrastructure and Technologies)پرسرمایہ کاری ہماری مدمقابل فرمونسےبہتررہی ہے	1	2	3	4	5	6	7
5. گزشتہ تین سال کےدوران ہماری فرم کاپیداواری وقت یا پیداواری دورانیہ(Production Time or Manufacturing Throughput Time)ہماری مدمقابل فرمونسےبہتررہاہے	1	2	3	4	5	6	7
6. گزشتہ تین سال کےدوران ہماری فرم کامجموعی پیداواری فنکشن (Production Function)،جیسےپیداواری لائحہ عمل(Production Processes)،حجم (Volume)،اوقات کار (Schedules)وغیرہ ہماری مدمقابل فرموں سےزیادہ لچکدارہاہے	1	2	3	4	5	6	7
7. گزشتہ تین سال کےدوران ہماری فرم کی صارفین کومال فراہم کرنےکی رفتار ہماری مدمقابل فرمونسےبہتررہی ہے	1	2	3	4	5	6	7
8. گزشتہ تین سال کےدوران ہماری فرم کا آرڈر سے لیکر پروڈکشن (Production)اور پھر ترسیل (Delivery)کاٹائم (Manufacturing Lead Time)ہماری مدمقابل فرموں سےبہتررہاہے	1	2	3	4	5	6	7
9. گزشتہ تین سال کےدوران ہماری مصنوعات (Products)کامجموعی طور پرمعیار(جیسےقابل بھروسہ ہونا،مضبوط ہونا،آرڈر کے مطابق ہونا) ہماری مدمقابل فرموں سےبہتررہاہے	1	2	3	4	5	6	7
10. گزشتہ تین سال کےدوران ہماری فرم کی نئی مصنوعات کو تیار کرنے کا ٹائم (New Product Development Cycle Time)ہماری مدمقابل فرمونسےبہتررہاہے	1	2	3	4	5	6	7
11. گزشتہ تین سال کےدوران ہماری فرم کا اپنی مصنوعات (Products) میں ویلیو ایڈیشن(Value Addition)ہماری مدمقابل فرموں سےبہتررہاہے	1	2	3	4	5	6	7

12. گزشتہ تین سال کےدوران ہماری فرم کاپروڈکشن کا سامان اورٹیکنالوجی ہماری مدمقابل فرموں سےبہترہی ہے	1	2	3	4	5	6	7
13. گزشتہ تین سال کےدوران ہماری فرم کاخودکار پیداواری نظام (Production Automation)ہماری مدمقابل فرموں سےبہترہاہے	1	2	3	4	5	6	7
14. گزشتہ تین سال کےدوران ہماری فرم کاکوالٹی کنٹرول کانظام(Quality Control System)ہماری مدمقابل فرموں سےبہترہاہے	1	2	3	4	5	6	7
15. گزشتہ تین سال کے دوران ہماری فرم کی مجموعی پیداواری کارکردگی(Manufacturing Performance) ہماری مدمقابل فرموں سےبہترہی ہے	1	2	3	4	5	6	7

7. بین الاقوامی مسابقت Internationalisation Competitiveness

براہ مہربانی مندرجہ ذیل بیانات کےسامنے دیئے گئےپیمانےکواستعمال کرتے ہوئے ہربیان کے متعلق اپنا اتفاق یا عدم اتفاق بتائیں۔

بیانیے	مکمل اتفاق						مکمل عدم اتفاق
	غیر جانبدار						
	1	2	3	4	5	6	7
1. اپنی مدمقابل فرموں(Competitors) کےمقابلے میں گزشتہ تین سال کےدوران ہماری فرم نےزیادہ نئی بین الاقوامی مارکیٹس (New Foreign Markets)تک رسائی حاصل کی ہے	1	2	3	4	5	6	7
2. اپنی مدمقابل فرمونکےمقابلےمیں گزشتہ تین سال کےدوران ہماری فرم کابرآمدی فروخت کا حجم(Export Sales Volume) زیادہ بڑھاہے	1	2	3	4	5	6	7

3. اپنی مدمقابل فرموں کے مقابلے میں گزشتہ تین سال کےدوران ہماری فرم نے برآمدات کی فروخت(Exports Sales)میں زیادہ مثبت رجحان حاصل کیاہے

1 2 3 4 5 6 7

4. اپنی مدمقابل فرموں کے مقابلے میں گزشتہ تین سال کےدوران ہماری فرم کی برآمدات(Exports)کی فروخت سے حاصل ہونے والا منافع زیادہ رہا ہے۔

1 2 3 4 5 6 7

5. اپنی مدمقابل فرموں کے مقابلے میں گزشتہ تین سال کےدوران ہماری فرم کی کل فروخت (Total Sale) میں برآمدات کی فروخت (Exports Sale) کا حصہ زیادہ بڑھا ہے

1 2 3 4 5 6 7

6. اپنی مدمقابل فرموں کے مقابلے میں گزشتہ تین سال کے دوران ہماری فرم کامقامی فروخت(Domestic Sales)کےمقابلےبرآمدی فروخت (Export Sales)کانفع زیادہ رہاہے۔

1 2 3 4 5 6 7

7. اپنی مدمقابل فرمونکےمقابلے میں گزشتہ تین سال کےدوران ہماری فرم کی مجموعی برآمداتی (Export Performance)کارکردگی بہتر رہی ہے

1 2 3 4 5 6 7

8. مارکیٹ کی مسابقت Market Competitiveness

براہ مہربانی مندرجہ ذیل بیانات کےسامنے دیئے گئےپیمانےکواستعمال کرتے ہوئے ہربیان کے متعلق اپنا اتفاق یا عدم اتفاق بتائیں۔

بیانیے مکمل اتفاق _____مکمل عدم اتفاق

غیر جانبدار

1 2 3 4 5 6 7

1. گزشتہ تین سال کےدوران ہماری فرم کی فروخت کی شرح و نمو (Sales Growth Rate) ہماری مد مقابل فرموں(Competitors) سےبہتررہی ہے -	1	2	3	4	5	6	7
2. گزشتہ تین سال کےدوران ہماری فرم کا مارکیٹ شئیرگروتھ ریٹ (Market Share Growth Rate) ہماری مد مقابل فرموں سےبہتررہاہے	1	2	3	4	5	6	7
3. گزشتہ تین سال کےدوران ہماری فرم کا مجموعی منافع ہماری مدمقابل فرموں سےبہتررہاہے	1	2	3	4	5	6	7
4. گزشتہ تین سال کےدوران ہماری فرم کی سرمائے پر نفع کی شرح (ROI) ہماری مد مقابل فرموں سے بہتررہی ہے-	1	2	3	4	5	6	7
5. گزشتہ تین سال کےدوران ہماری فرم کی مجموعی طور کم وسائل کے ساتھ زیادہ مصنوعات بنانے اور منافع حاصل کرنے کی قابلیت (Overall Productivity) ہماری مد مقابل فرموں سےبہتررہی ہے-	1	2	3	4	5	6	7
6. گزشتہ تین سال کےدوران ہماری فرم کی مجموعی مسابقتی پوزیشن (Overall Competitive Position) ہماری مد مقابل فرموں سےبہتررہی ہے-	1	2	3	4	5	6	7

کیا آپ اس سروے کے نتائج موصول کرنا چاہیں گے؟ ☐ ہاں ☐ نہیں

(اگر ہاں تو ، براہ مہربانی رابطے سے متعلق درج ذیل معلومات مہیا فرمائیں)

ای میل(Email) _____

فون نمبر _____

نام و پتہ _____

کیا مسقبل میں مزیدمعلومات کے لیے، میں آپ سے رابطہ کر سکتا ہوں؟ ☐ ہاں ☐ نہیں

آپ کے وقت اور تعاون کا بہت بہت شکریہ

APPENDIX 4: ETHICS APPROVAL LETTER

RMIT UNIVERSITY

Deputy Pro Vice-Chancellor
(Research & Innovation)
College of Business

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Australia

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Notice of Approval

Date:	29 June 2017
Project number:	20881
Project title:	*Evaluating the Effect of 'Common Facility Centre Program' on SMEs' Competitiveness in Pakistan*
Risk classification:	Low Risk
Chief Investigator:	Prof Pia Arenius
Student Investigator:	Khuram Shahzad
Other Investigator:	Dr Afreen Huq
Project Approved:	**From: 29 June 2017 To: 8 August 2020**

Terms of approval:

Responsibilities of the principal investigator

It is the responsibility of the principal investigator to ensure that all other investigators and staff on a project are aware of the terms of approval and to ensure that the project is conducted as approved by BCHEAN. Approval is only valid while the investigator holds a position at RMIT University.

1. *Amendments*
   Approval must be sought from BCHEAN to amend any aspect of a project including approved documents. To apply for an amendment submit a request for amendment form to the BCHEAN secretary. This form is available on the Human Research Ethics Committee (HREC) website. Amendments must not be implemented without first gaining approval from BCHEAN.
2. *Adverse events*
   You should notify BCHEAN immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
3. *Participant Information and Consent Form (PICF)*
   The PICF must be distributed to all research participants, where relevant, and the consent form is to be retained and stored by the investigator. The PICF must contain the RMIT University logo and a complaints clause including the above project number.
4. *Annual reports*
   Continued approval of this project is dependent on the submission of an annual report.
5. *Final report*
   A final report must be provided at the conclusion of the project. BCHEAN must be notified if the project is discontinued before the expected date of completion.
6. *Monitoring*
   Projects may be subject to an audit or any other form of monitoring by BCHEAN at any time.
7. *Retention and storage of data*
   The investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.